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CUYAHOGA RIVER IMPROVEMENT.

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MEASURING A SNAG THAT CAME THROUGH THE PIPE.

The Cuyahoga river at Cleveland is at present navigable for vessels drawing 20 ft. as far as the Jefferson street bridge, a distance of four miles from the mouth. During the past two years a number of changes have been undertaken and are now nearing completion. A new cut has been made at Jefferson street which does away with a dangerous bend and in place has substituted a straight channel 200 ft. wide and 20 ft. deep, with substantial docks on each side,

and spanned by a double rolling lift bridge, leaving a clearance between piers of 120 ft. The piers are completed and the erection of the bridge began Nov. 1 and will be completed by the opening of navigation next year.

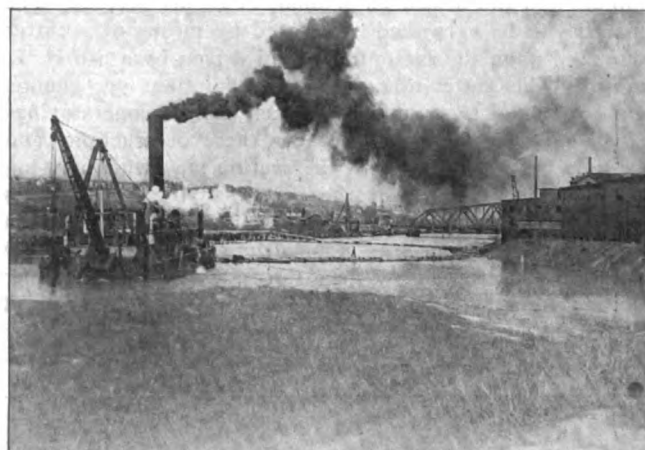
Above this new cut the Newburgh & South Shore R. R. has constructed a new Scherzer rolling lift bridge having a clearance between piers of 120 ft. This bridge is the longest single rolling lift bridge in the country as it crosses at a slight angle instead of at right angles to the stream. Just above this bridge the Cleveland Terminal & Valley railroad is building an exact duplicate of the Newburgh & South Shore bridge which ought to be finished by June 1, 1906.

From this point begins what is known as the upper river improvement which will, when completed, add one mile of navigable river 200 ft. wide, 20 ft. deep with a winding basin 600 ft. wide where the largest of freighters that can pass the narrow stretch of river below Columbus street (which is about 450 ft. long) can turn around under their own power.

Before the dredging operations could start it was necessary to construct pile and timber bulkheads on each side of the river in order to hold the bank from washing into the river. There has been about 4,500 ft. of such bulkhead already constructed or contracted for by private in-

terests and the city has built about 2000 ft. In straightening the river at the winding basin, opposite the Weigh lock the city spent \$18,000 for the land and \$7,294 for grading. The estimated cost of the dredging is \$125,000 and dredging began Sept. 15, 1905.

This entire improvement will cost about \$218,700 of



THE DREDGER AT WORK.

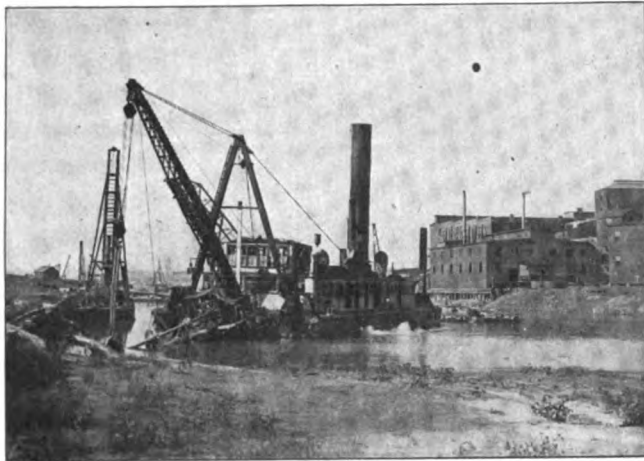
which the city pays \$168,710. A very interesting feature of this project is the manner of disposal of the dredged



SOME OF THE MADE LAND.

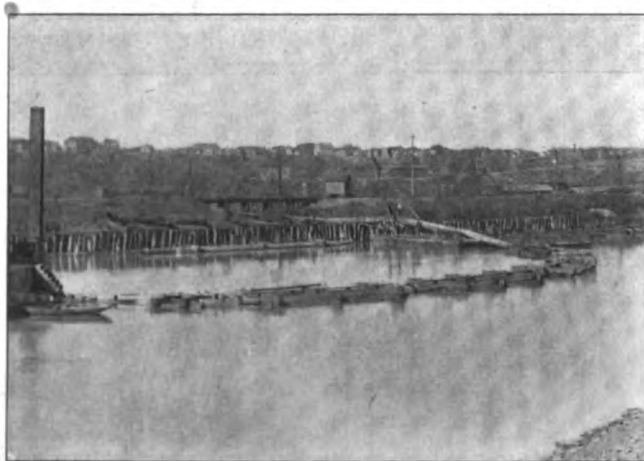
material, which instead of being towed out into the lake as

is customary, is being deposited upon the land on each side of the river. The large hydraulic dredge of the L. P. & J. A. Smith Co. is at work performing the work for Williams Bros. & Morse, the successful bidders for this contract, and about 10,000 cu. yds. per day are being removed. This dredge has a 1000 H. P. triple-expansion marine engine supplied with steam from two scotch boilers 12



VIEW OF THE DREDGE.

ft. in diameter and carrying 160 lbs. pressure. The centrifugal pump is 8 ft. in diameter and is direct connected to the engine. The pump has a capacity of 20,000 gallons per minute and the discharge is about 11 ft. per second. The material to be excavated is agitated by means of a cutter mounted upon the suction pipe and driven by a 250 H. P. motor. This cutter makes twenty revolutions per minute. On account of the numerous sunken logs the operator has to be on a constant lookout for these obstructions and he tells by the vibration of the suction pipe when any log is encountered. One of the accompanying photographs shows the cutter with a large tree in the wheel. In this instance the machine was stopped immediately before any damage was wrought but nevertheless it gave the operator quite a scare as in another moment had this log revolved in the cutter until it became fast to the bottom of the river it would undoubtedly have put the agitator out of commis-



THE PIPE LINE.

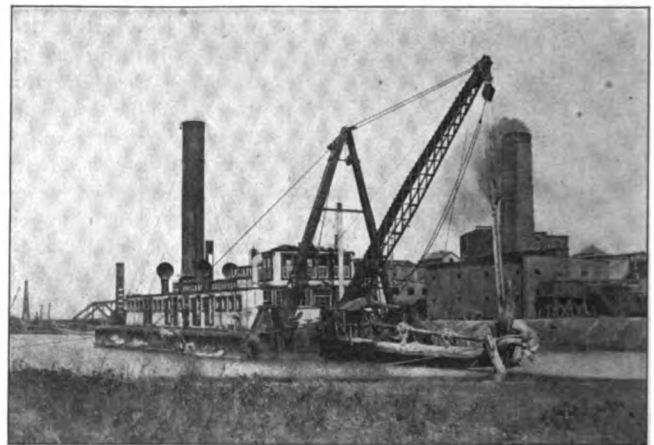
sion. The pipe line is supported by pontoons and is connected by heavy rubber sleeves held in place by iron bands securely bolted on but which can be removed to allow additional pontoons to be inserted as the dredge advances. These rubber sleeves allow the pontoon line to be more or less flexible and it curves as the dredge swings from one side of the river to the other. At the shore end the pontoon line is held in a stationary position and from

here the pipe line consists of 24 inch steel pipe which fit closely together and leads to the place of deposit. One of the illustrations shows the dredge and pontoon line leading to the shore. At the time this view was made there was 1800 ft. of pontoon and pipe line being used.

The area between the two railroad tracks, the Newburgh & South Shore and the Wheeling & Lake Erie was very low and was only used as a dumping ground for the blast furnace cinder from the neighboring furnaces. It was found that the dredged material could be deposited here and the low land is being filled to grade with the finest kind of sand and gravel from the river dredging. One of the photographs shows the material deposited to date upon this low land. Observe the dark spots in the foreground, they being pieces of logs cut up by the cutter and pumped through the line of pipe.

One would scarcely believe that a piece of log 40 in. in length and 1½ ft. thick could in any manner pass through the pump and find its way past the numerous turns in the pontoon line to the dump ground. Yet this is exactly what occurred and this piece was so large that two men could scarcely lift the piece of log. This fill is as solid as the surrounding soil and even while the water is flowing over the fill a team of horses can be driven across it without sinking perceptibly.

It is probable that by June 1906 the dredging will be



SHOWING THE CUTTER.

completed and navigation opened as far as the plant of the Cleveland Furnace Co. This will give Cleveland two miles more of river frontage and no doubt that this improvement will be the means of many new industries locating upon the land adjacent to the newly improved channel of Cuyahoga river.

SHIP BUILDING DURING NOVEMBER.

The bureau of navigation reports 66 sail and steam vessels of 17,976 gross tons were built in the United States and officially numbered during the month of November, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam		No.	Gross
	No.	Gross	No.	Gross	No.	Gross	No.	Gross		
Atlantic and Gulf.....	25	4,291	15	411	.....	4	1,408	.....	44	6,110
Porto Rico.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
Pacific.....	1	343	4	115	.....	.....	.....	.....	.....	458
Hawaii.....	.....	.....	3	239	.....	3	10,545	.....	6	10,784
Great Lakes.....	.....	.....	10	461	.....	1	163	.....	11	624
Western Rivers.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	26	4,634	32	1,226	.....	8	12,116	.....	66	17,976

The Erie canal was officially closed to navigation on Nov. 28.

THE TUGS OF LONG AGO.

The following item is going the rounds of the marine columns:

"Old marine men rubbed their eyes yesterday when the tug W. B. Castle passed up towing six coal-laden schooners, followed by the tug Salvor with a string of three schooners with coal. The sight recalled scenes of years ago.

"There were giants in those days." Matchless in their strength and beautiful in their graceful lines, sleek and well kept, were ready for the battle and when pitted, fighting to the last and then yielding only till the next encounter, the tugs of 30 years ago were a delight and a wonder. Fallen from their high estate a few are left to prolong a wretched existence towing plebeian rafts or an occasional wrecking job. The days of the fleets of lordly schooners and barkentines, marshaled by the arrogant tug have gone forever. Who that

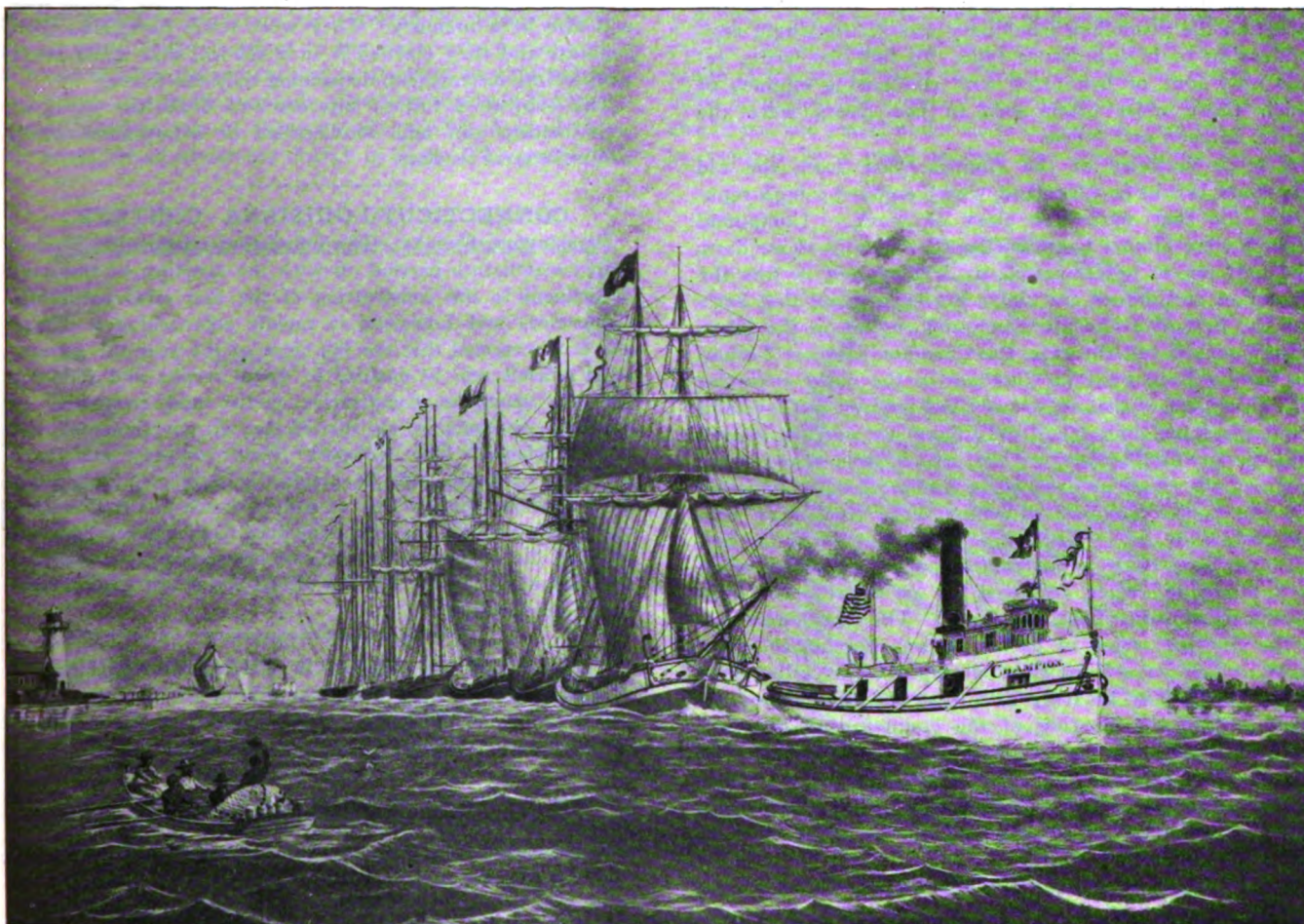
at 22nd street, Detroit, slowly decaying, was burned at Put-in-Bay. It seemed as tho' the end of the tug fleet had come.

The impotent struggles of the Laocoon; writhing in the folds of the serpents were not more touching than the decline and decay of this once proud squadron. Beautiful in model most of them were, with the grace and clean cut symmetry of the race horse and were fondled and petted and painted and gilded by loving crews who yet did not spare them when the time came, and many a hot race for hours upon hours and days upon days with long and heavy tows have they put up.

The writer recalls most of the tugs of the early seventies when the fleet was in its prime and their names are given below tho' possibly some have escaped the memory.

Champion
Balize
Samson
Clematis

John Owen
Niagara
Andrew J. Smith
Winslow



TUG VICTORY AND HER TOWS.

remembers the fleets of the 70's can recall them without a regret? Tows of six, eight or ten schooners were common and the earnings of the larger tugs were often greater than those of the 8000 ton steamer of today. The tug captain was a man not to be lightly esteemed and he took care to insist on being accorded full consideration. The picturesque profanity of the Mississippi assumed the wildness of a Sunday school golden text in comparison with the lurid dialect of the tugman. But he was every inch a sailor. No weather was too heavy for those craft and their crews were of the stuff to stay. Every other tug was a hated rival even if belonging to the same owner and they seldom went without a struggle to the death.

Their decline has been pitiable and when a couple of years ago the never-defeated queen of the old fleet, the peerless Champion, which for some years had lain ignobly in a slip

Gen. Burnside
Geo. B. McClellan
U. S. Grant
Constitution
Crusader
Kate Moffatt
Frank Moffatt
Mocking Bird
W. A. Moore
John Prindiville
Kate Williams
Gladiator
Geo. E. Brockway
Thos. Quayle
W. B. Castle
Satellite
Torrent
Livingstone
Tawas
Justice Field
D. D. Porter

Oswego
M. F. Merrick
O. B. Wilcox
Wm. Goodnow
Vulcan
I. U. Masters
Zouave
John Martin
Geo. N. Brady
Pringle
Geo. H. Parker
Sweepstakes
M. Swain
L. L. Lyon
Bob Anderson
Music
Alanson Sumner
J. P. Clark
River Queen
E. M. Peck

Of these the Balize, Crusader, Mocking Bird, Castle, John Owen, Andrew Smith, Winslow, Brockway, Merrick, Kate Williams, are still with us to the best of the writer's knowledge. The Field is now the Traveler and the Sumner the Howard. The U. S. Grant was renamed the Edsall and later became the Canadian survey steamer Bayfield. The Frank Moffatt blew up at Sombra. The Prindiville became the Charlton. The Pringle became the Onaping. The Moore was dismantled. The Quayle, Oswego, Brady, Martin, Goodnow and Swain burned.

The Livingstone sank in Lake Michigan from a broken shaft. The Satellite sank in Lake Superior. The hulls of the Burnside, McClellan and Zouave rotted away in Detroit river. I do not remember whether they were dismantled or burned. The Sweepstakes was taken to the Atlantic coast. The Wilcox sank in Lake Huron.

The Niagara came to grief on the rocks of Lake Superior. The end of others has escaped me. Almost without exception the propelling machinery was of the single non-condensing or high-pressure type. In fact the writer recalls only four or five fitted with condensing engines of which those most often seen in the rivers were the Balize, Samson and Music.

A large majority of the engines were from the old Cuyahoga Works in Cleveland, which enjoyed a high reputation for that particular class of work. Compound engines were almost unknown on the lakes in those days. The first tug to be converted, as I remember it, was the Champion and indeed the claim has been made that her's was the first fore and aft compound engine on the lakes, though such is not the case, the Canadian steamer Tecumseh having been built in Chatham in the early seventies with an engine of that type, and the Egyptian in Cleveland about the same time, while the Champion was not altered until '80 or '81. Thereafter the new system made rapid progress, the single engines being converted into "steeples" and the double engines, of which there were very few, into "fore and aft." Wood was very largely used for fuel and there was many a hot race for some particular wood dock along the river, followed by an equally hot fight for the possession of the wood pile. The Canadian shore of the St. Clair river in particular was lined with wood docks, which have long since disappeared or fallen into decay, and it may be truly said, that the tugs played no small part in the clearing of the country, and how the wood did fly! Time was too valuable to spend along side of a wood dock and those wood piles disappeared like magic. Gradually all this changed and coal became the only fuel and much of the old-time hurrah and excitement was done away with.

As the business for the tug diminished, the list also shortened from various causes and a number were dismantled and then machinery utilized for boats for other purposes. A number went to the scrap heap. But their memory lives.

I wonder how many will read this and remember the days when as youngsters we sat on the bank or the edge of the dock, when we were supposed to be in school and bet our millions on the superiority of our favorite tug. The Champion was first choice always, all bets were for second place. I remember one lad who was always ready to back the Satellite against the world, because she had such a handsome panel in the side of her texas with her name in beautiful gilded scroll letters. Another hot favorite was a tug (the Clematis, I think) with an Indian warrior, rampant on top of her smokestack. That warrior stood for business and it meant that he could lick creation or he wouldn't be there. For myself, I always put my money on the Livingstone, because she "had a pull." The biggest tow I ever saw in my life she had behind

her, either twelve or thirteen schooners, bound up. There are those who say that the name still has the same significance and that the Lake Carriers know it.

There is also one sad picture that comes back to me, though it did not so impress my young mind at the time and that is the blowing up of the Tawas at the foot of the rapids. A few of us were watching her, apparently racing with another tug, the Moore I think, both with tows, when there was a deafening report, a cloud of smoke, steam and debris, and where the Tawas had been a moment before was nothing but some wreckage. I do not now recall the fatalities, but remember that one man was blown high in the air and fell on the leading vessel in the tow, the schooner Sam Cook. That gave us something to talk about for long afterward and gave a few of us the center of the stage.

The roster of the old tug captains and engineers is gradually becoming shorter, and before many years they will also be a memory. They were letter-perfect in their business and they learned it in a school, that made short work of the incompetent, demanding only the fittest.

The subject is full of interest and doubtless many of your readers can add recollections or information which will make good reading. H.

CONNECTICUT-LOUISIANA CONTEST.

Washington, Dec. 11.—The interesting competition in steel ship construction carried on with the sanction of the navy department in the construction of the first class battleships Connecticut and Louisiana is rapidly approaching a climax and it is expected that ere the close of the year the government officials will be enabled to weigh results and render a decision upon the comparative merits and economies of armored construction as carried on at governmental and private plants. The Newport News company announces that the Louisiana will be practically completed and ready for her official trial on Dec. 12 and inasmuch as the Connecticut, building at the Brooklyn navy yard has for several months past led her competitor in state of completion it is expected that she will be ready for the official speed test several days before the Louisiana.

CHANGES IN SENATE CHAIRMANSHIPS.

Washington, Dec. 11.—After the first of the new year there will be a number of changes in the committees of the United States senate and particularly in committee chairmanships which are likely to have some bearing upon iron and steel and ship building interests. There will be a contest between Senator Millard and Senator Kittridge for the chairmanship of the committee on interoceanic canals which will of course have jurisdiction in the matter of the Panama project and there will be several other changes equally far reaching in effect.

BIDS FOR STEAM PUMPS.

Washington, Dec. 11.—The Panama Canal Commission will in the near future invite bids for two steam pumps, duplex or equal, of about 4½ in. steam end; 3¾ in. water end and 4 in. stroke to be fitted with brass chambers and brass pluggers in water end and to deliver 65 gallons of water per minute. The commission is also ready to purchase one universal wood trimmer with stand complete; length of cut 24½ in.; height, 8 in. size of bed 24 by 40 in.; distance between gauge, 24½ in.; and length of stroke 32½ in.

The Southern Railway has made an offer acceptable to the bondholders committee for the Trigg ship yard embracing all the real estate except the dock. It is understood that the railway company will use the land for depot and warehouse purposes.

NAVAL ARCHITECTS AND MARINE ENGINEERS.
Mr. Horace See's Paper Upon Steam Boiler Troubles Is
Entertainingly Discussed.

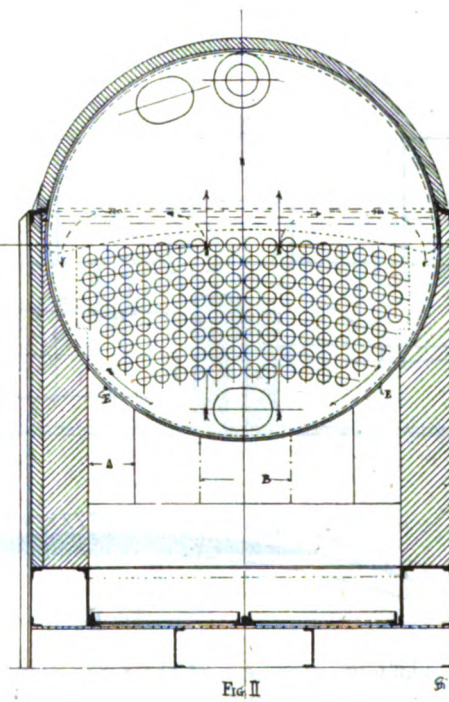
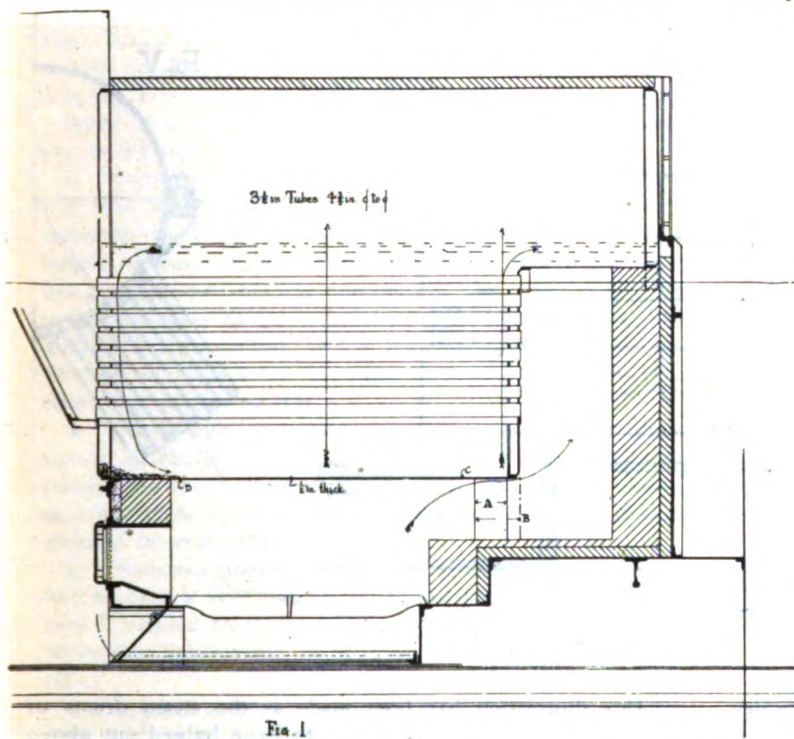
At the recent meeting of the Society of Naval Architects and Marine Engineers in New York city, one of the much discussed papers was upon the subject "Some Notes on Steam Boiler Troubles," by Horace See. The paper was as follows:

This paper, illustrated by examples coming under my observation, is presented in the belief it shows how some of the troubles of the steam boiler can be directly traced to bad design as well as points out the characteristics found responsible for their occurrence. The examples may be considered as having been taken from extreme cases, and rightly so if what is reported had happened under extraordinary conditions; but as the troubles took place under ordinary ones are not so chargeable. They, moreover, are believed, whether moderate or extreme, to throw some light on many of the troubles of the water-tube boiler and point out what arrangements of parts must be rejected if like troubles are to be avoided. The first example is from a set installed in one of three vessels, with boilers of the same type, placed under my charge in 1893. They were of

some places. The bulging of a shell sheet on the first trip may have been due, as has been claimed, to the boilers having on their completion been left dirty from failure to remove whatever had been collected whilst being built, but this will not account for the accidents later on that called for frequent repairs and renewal of patches at C and D. Efforts had been made before my time to remedy the trouble at C where the metal had cracked between the rivets by introducing a pier in the center at B in place of the side ones at A, a procedure whilst successful in protecting the joint introduced another similar to what had taken place at D where the metal had also bulged out.

The troubles, however, were not confined to the shells, but extended to the tubes, and there mostly to the upper rows, some of which frequently did not last long enough to make a single trip.

When the shells were found to have been reduced to 3-16 of an inch it occurred to me this was a case where excellent results would be obtained by keeping down the range of temperatures in the steam cylinder, so it was decided to reduce the pressure to 40 pounds per square inch, and to run the vessel under these conditions until she could be replaced by a more modern one better suited for the



the return tubular variety, or a combination of the water and fire tube, as shown on Plate No. 1, figures 1 and 2, and were built for 90 lb. of steam. The shell was 8½ ft. in diameter and ½ inch thick, containing 130 tubes 3½ inches in diameter and No. 9 B. W. G. thick, spaced 4¾ in. center to center. The length of two boilers was 8 ft. 7¾ in., and that of two others 8 ft. 11¾ in. The grate was 5½ ft. long by 6 ft. wide, emptying into a combustion chamber 24 in. deep. They were supported and surrounded by fire brick, together with a metallic casing. They generated steam for a vertical surface-condensing screw propeller engine with one cylinder, 44 in. in diameter by 72 in. stroke of piston, fitted with poppet valves operated by trip gear.

The boilers in all of the vessels gave trouble very early, the shell over the furnace at C of this particular one coming down on the first trip shortly after leaving port, and later at D also. The metal inside at E also began to waste away until what had originally been ½ inch in thickness in one of the vessels was eventually reduced 3-16 inch in

trade. Another gain expected was the cutting down of the expensive repairs on the engine, brought about by the pressure that had been carried. A trouble of another kind, but of short duration, not anticipated, cropped out after orders had been given limiting the pressure. This was with the engineer who, on the night before the ship sailed, came to my house much worried and informed me the vessel would never reach New Orleans if no more than 40 pounds was to be carried. He changed front, however, when told if he did not take her out some one else would be found to do so, and then agreed to do his best to get her there notwithstanding his doubts, which he accomplished with results fully up to my expectations and corresponded with what Mr. Isherwood had so clearly proven on the Michigan, and, in passing, let me say the work of this man has not been thoroughly appreciated, not only in the case just quoted, but also in that of the San Jacinto, where he clearly demonstrated in the experiment carried on in that vessel that the water and steam in a boiler wanted to move in

lines of least resistance in order to obtain the best results, although the gases should move in those of greatest. To come back to my experiment, the time made by this vessel even on the first voyage was under the new conditions equal to what it had been with the high or original pressure, but the coal consumption was less, as well as what was of equal importance, the repairs to engine and boilers.

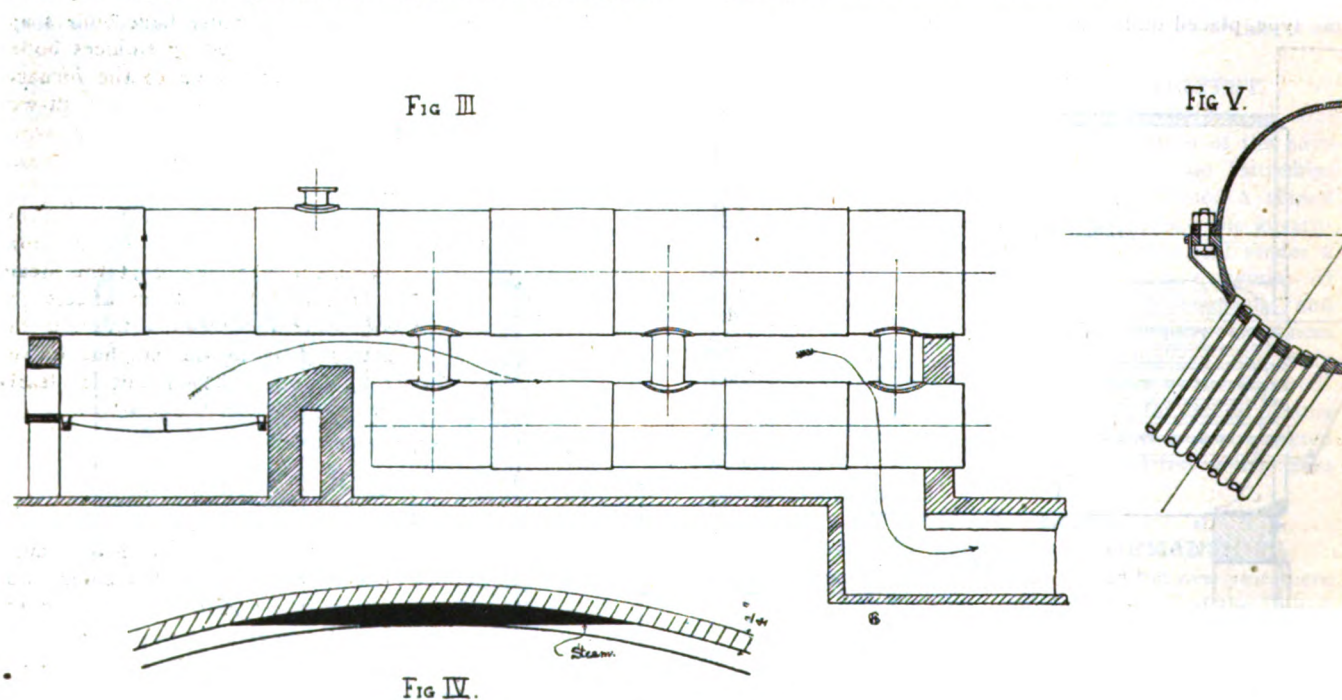
After tubes had been taken out, holes plugged up, and zinc used liberally inside the boiler without affording much relief, it seemed to me worth while to try galvanizing, so when the plain ones gave out they were replaced by others so treated. The wisdom of this move was soon apparent, as they stood the test better than had been anticipated, lasting from two to three years, which under the trying conditions was excellent.

The conclusion reached by me as to the cause of both the troubles was that they were, undoubtedly, due to the nature of the circulation brought about by the lay of the surfaces exposed to the heat and by crowding the tubes into the boiler. The horizontal lay of the shell also favoring the deposit of foreign matter, first where the circulation was sluggish away from the fire, and then by degrees

trouble would continue until it was allowed to freely leave that point as soon as generated. The expense incurred and trouble experienced had been so great that it did not take long to decide to add hats to tap the outside as well as the inside rims. With their introduction troubles not only disappeared, but the efficiency of the boilers was greatly improved. Since then they have, in good practice, been applied only at this point.

The last example or that supplementary to the previous one is from a set of four subvertical drowned water-tube boilers installed in connection with two Scotch on the gun-boat Nashville, as shown on plate 2, figure 5. A type the Admiralty Committee on Naval Boilers reports is not only "superior to the other types" (horizontal tube) as regards reduction of temperature in the uptakes, but also the only one that "can be severely forced without danger." It is well to state this is based on the amount of coal burnt per square foot of fire grate per hour, as follows:

Belleville	27 pounds
Babcock & Wilcox	29 "
Durr	35 "
Yarrow	40 "



over it, as did the closeness of the tubes restrict the descending and ascending currents to roughen their surface as well as that of the shell, so as to invite oxidation to hasten destruction.

The next example is from a set of plain cylindrical boilers with mud drums connected to them by hats or tubes at the inside and not at the outside rims, as shown on plate No. 2 figures 3 and 4. This boiler, naturally belonging to the water-tube variety, was arranged in this particular case to receive the gases either from the blast furnace or from a fire in its own furnace at the front end. They met with trouble, but not where it most naturally would have been supposed to take place—that is, at the joints from the extra thickness of metal together with that of the rivets, but at the top of all of the outside sheets of the lower drums, where the plates were not only forced out of shape but cracked so that a patch was necessary. These went like the sheets themselves until some one, whose name is lost from the list of scientists, advanced the very simple theory that steam held above the inside sheet, in this case $\frac{1}{4}$ inch in depth, was the cause, and that the

This digression has been made as the steam drums of the Nashville's boilers are said to have bulged out above the water line, but at what particular time this took place has not been stated, presumably after the contract trial, as the account given of this trial in Vol. IX *Journal of American Society of Naval Engineers*, makes no mention of it, the only comment being "the boilers steamed steadily, the Yarrow boilers carrying steam almost as steadily as the Scotch type." The severity of the trial can be judged from the fact that $56\frac{1}{2}$ pounds of coal per square foot of grate were burnt in the water-tube boilers, being 40 per cent. more than what it was in the case of those in the Medea, quoted from the Admiralty Committee's report; therefore under conditions which should have developed a defect at the point mentioned. The severity of the trial can be further judged from the fact that with a battery of boilers, containing a total of 142 sq. ft. of grate and 5,350 sq. ft. of heating surface, 2,535 I. H. P. was developed, or 17.86 I. H. P. per sq. ft. of grate and .474 I. H. P. per sq. ft. of heating surface. The speed maintained being 16.299 knots, against 14 required by contract, or 2.299 knots in excess

a contract performance, if I am not mistaken, unequaled by any vessel built for the navy of the United States. It is perfectly natural to suppose the severity of this trial with steam on the boilers at 252 pounds per square inch would have developed the trouble reported afterwards and therefore leads to the suspicion that they became the victims of neglect. A view emphasized by the fact that after this experience others without protection above the water line have been accepted, presumably to save weight although many builders now protect this part, believing it best not to take any risk.

I am, however, perfectly willing to assume the responsibility for what happened in this case, it having been charged up against me, as it was undoubtedly bad practice to leave unprotected surfaces with steam on the inside subjected to the heat of gases on the outside, even if the latter had lost a large amount of heat in their passage past the tubes. It was contrary to what, by me, had been considered necessary to avoid like troubles; but as the design was that of one who had built a number without protection at this point it was accepted, as had been my practice in similar cases, until disproved by the use of the article.

The above case, together with the preceding one, are believed to point out what may happen if the gases, even after being robbed of some of their heat, are brought directly in contact with the metal of a boiler where steam, whether free or closely confined, is on the opposite side.

Some of the lessons believed to be taught in the above are as follows:

1. Restricted circulation, whether partial or complete, will lead to the destruction of the parts coming under its influence in proportion to the degree of severity and length of time of its continuance, consequently the freer the passage and less the obstruction, the more direct the course, whether upward or downward, of the currents, and greater the proportion of the area of the passage to the amount of surface to be met, the smaller will be the amount of wear and tear.

2. The margin of water lanes in the steam boiler alternately contracted and expanded will at the narrowest points, like the bottom of a river at jetties, be worn away in proportion to the strength and volume of the stream moving through them.

3. Protected pockets permitting sediment to be deposited so that it will eventually extend to where no protection is offered from the heat will also lead to destruction in inverse proportion to their size and time required to fill.

4. Circulation of the water should be free, and with the least amount of restriction, not only on account of direct wear from friction, but also on account of corrosion due to the action of free air in the water on the roughened metal, and that heating surfaces should be arranged so as to be away from any point where deposit may accumulate.

5. The life of a tube may be increased by galvanizing the surface, thereby affording not only protection, but at the same time minimizing resistance from the fluids brought in contact with it by presenting a smoother surface.

6. The strength of the metal of a boiler exposed on the one side to the heat of the gases from a furnace and on the other to that of steam, will be affected in proportion to the difference in temperature between that of the gases and that of the steam.

DISCUSSION ON MR. SEE'S PAPER.

Mr. John Reid: As Mr. See has had considerable experience with galvanized tubes it occurs to me to be interesting if he could tell us about the accumulation of scale in galvanized steel, whether there is more or as much ac-

cumulation in galvanized as in the ordinary tubes of iron.

Mr. See: I have found that the smoother galvanized surface appears to shed the scale more readily than the surface of tubes not so protected. In fact in this particular case the unprotected tube was being roughened by the adhesion of scale and the galvanized one was not.

Mr. F. L. DuBosque: The idea of the flue matters of Mr. See cannot fail to command the respect of every member of this Society. Mr. See has laid down here certain features, certain rules that should be observed in designing power boilers. I do not suppose there is any body connected with boilers in this Society who does not know these things. What we should like to know is how to accomplish them. Mr. See has had very great experience in this line, and I would like to draw some of them from him. The boilers referred to in this paper are obsolete and long past present conditions, and the just methods of caring for these are of only relative importance to us. But we are all familiar and have in use every day the Scotch boilers recognized as good boilers, yet I venture the assertion that hardly any designer of Scotch boilers is fully convinced how near the last flue should be to the top of the boiler. We repeatedly have boilers apparently well designed, boilers designed by eminent boiler makers, in which the flanges come down to the furnace, no matter how great is the care. The common answer has been is oil. I believe there is some relation between the hydraulic heat, in other words how much water should be on top of the furnace. I might go on enumerating them, but I want to speak of one case of the Yarrow boilers, the effect of the super-heated steam apparently on the metal of the Yarrow boilers, for that the steam does affect the shell. If superheated steam affects the shell why should it not affect the tubes. I think if the cause lies in any direction it is in the sulphur in the gas on the exterior of the drum. The result is clearly shown in the tops by the wasting away of the metal.

Mr. See: In reply to Mr. DuBosque in relation to furnaces and high pressure boilers, some years ago there was trouble with one of the early boilers of the ferry boats, I think Mr. Stevens will recollect something about that. They got up quite an argument on the cause. It was attributed to a variety of causes, but some poor fellow advanced the theory it was grease, and they sat down on him. It was too ordinary a cause. It could not be grease. It was not scientific. It was though, from grease. Where furnaces come down it is almost invariably from grease. I have had a number of cases of the furnace coming down in tug boats reported to me. They were specially built boilers with flat sides and round bottom, what was known as the Kidney boilers. They were connected with sockets and had irons going around underneath. And when that furnace came down, a locomotive inspector got hold of it and said it was on account of the lack of support. We sent a man to the locality where the vessel was, and the repairs cost a great deal. I advised the gentleman interested, that if the furnace came down again he had better obtain permission to come under reduced pressure and have it done at the works. Well, the furnace came down again, and then we found the evidences of grease. But we never find powder after it has exploded, and after grease has been burned we do not find the grease, most naturally. The boat was then at Philadelphia. I sent an inspector to the vessel to examine it and report what was necessary to be done. So we put a new furnace back in the original position and fired up, and the inspector came and saw that the pressure was on, and said "you see that pressure, we have on this pressure and nothing has happened to it. If that comes

down again I will take your license away from you." It did not come down again. Attention was paid to keeping the grease out of the boilers. In the early days people used grease in unlimited quantities and it did a great deal of damage. We will take tallow. It was treated with acid to keep it sweet. Some tallow has natural acids and we have found it in the flues and in the joints of the cylinders, and I have known the cylinders where the joints between the ports were eaten away with tallow.

President Bowles: I am sure we are grateful to Mr. See for this paper. A man of his experience, however, should know that in order to produce a discussion it is necessary to attack a really successful boiler.

The next paper to be read was upon the subject "Notes on the Strength of Watertight Bulkheads for Battleships and Cruisers," by Harold F. Norton. This with Capt. Hovgaard's illuminating discussion upon it will be published in full in the *Review* later.

RAILROAD RATES AS SEEN ABROAD.

The *London Statist* for October 28 says: "The report of the Great Northern Railway Company just to hand shows in a striking manner the policy which that company has followed in the last twenty-five years to the immense advantage of the States it serves. In 1881 the average freight rate obtained by the Great Northern was 2.88 cents, while for the year ended June 30, 1905, the average was .792 of a cent. This enormous reduction in rates means that for the past year the company received a revenue of \$33,000,000, whereas had it maintained the rate it received in 1881, its freight revenue would have been \$120,000,000. Therefore shippers have not only gained the advantage arising from the provision of adequate transport facilities but the community has gained \$87,000,000 by the reduction in rates." The *Statist* further says that it is evident "that neither in the West, nor in the East, nor in the South are the rates now charged by American railways for the transport of freight unduly high, either relatively to their past rates or to the ability of the traffic to bear them, or to the rates charged in any other country in the world."

NEW DRY DOCK AT LORAIN.

Work on the new dry dock of the American Ship Building Co. at Lorain, Ohio, which was begun in the early fall by Messrs. Barnet & Record, of Minneapolis, Minn., is progressing well. The dredging of the slip is half completed and the pile driving of the protection has been commenced. The plans and specifications for the work were prepared by Messrs. Ritchie & Ruple, consulting engineers, Cleveland, who are also superintending the construction. The dock will be the largest on the great lakes and among the largest in this country. The dimensions of the dock are as follows: Length on bottom from outer sill to head of dock, 732 ft.; length on top from outside of abutments to head of dock, 764 ft.; width of basin on bottom, 85 ft.; width of basin on top, 125 ft.; width of entrance on bottom, 75 ft.; width of entrance on top, 80 ft.; depth of water on inner sill, 15½ ft.

The gate will be of steel of the caisson type. The entrance abutments and aprons will be of Portland cement concrete, and will cover an area of 44 ft. by 173 ft. 8 in., extending from 4 ft. above the water to 32 ft. below it, and will be enclosed in a casing of 8 x 12-in. tongue-and-grooved sheet piling. The south abutment will be 32½ ft. by 44 ft. on top, and the north abutment 63 ft. 2 in. by 44 ft. In the latter abutment will be located the pump house 30 ft. by 26 ft., the floor of which will be 16 ft. below the top of the abutment. In this will be placed two 36-in. centrifugal pumps driven by electric motors placed on top.

The dock will be constructed on a pile foundation, and the basin will be of timber planked with 4-in. white oak. All the timbers except the plank will be of Oregon fir. The basin and abutments will be enclosed within a sheet piling protection, consisting of two lines of 8 x 12-in. tongue-and-grooved piling. The inner line of the protection will be 10 ft. from the coping of the basin, and the outer line will be 30 ft. from the inner. The two lines will be braced and tied by 12 x 12-in. timbers and 1¾-in. steel rods, and the slopes of the dock will be anchored to the inner line of the protection by 1¾-in. steel rods. About 400 ft. of the north side of the dock and the protection will be constructed in a slip now used for launching vessels, and will require extra heavy work for holding it when pumped out. The coffer dam will be of similar construction to the protection, only more strongly braced. It is expected that the dock will be completed by the end of the year of 1906.

Messrs. Ritchie & Ruple, the consulting engineers, also designed the first dry dock at Lorain in 1896. This was 500 ft. long and has been lengthened to 550 ft. As soon as the new dock is completed the old dock will be again lengthened. The same engineers also designed the dry dock of the Skinner Ship Building & Dry Dock Co., of Baltimore, Md., which is 600 ft. long, as well as several similar dry docks on the great lakes.

OBITUARY.

Capt. Samuel S. Brown, the well known coal operator and horseman, died Monday morning, at his home at Brown Station. He was born Sept. 15, 1842, in Minersville, now the thirteenth ward, Pittsburg. He was the son of Wm. H. Brown, who was a miner by profession, and employed in the Minersville district. Brown, the elder, managed to save considerable money and finally went into the coal business for himself, later branching out in an extensive way. At the time of his death in 1875, he was one of the largest mine owners in the Monongahela valley, owning a score of steamboats and hundreds of river barges. Samuel S. Brown was the eldest son. He was only nineteen years of age when the civil war broke out, and spent much of his time in the south, and on his father's boats. His father not only had contracts for furnishing the government with coal at Pittsburg, but also to gunboats stationed at various points. Young Brown enlisted in the army and had a good war record. At the close of the civil war he entered the office of his father and learned every detail of the great coal business. He and his brother Capt. W. Harry Brown, succeeded to the business upon the death of his father. Capt. S. S. Brown was part owner in such vessels as the Natchez and the Robert E. Lee whose great race in 1875 attracted the attention of the whole country. These were the days before the railways when there was great money in the river business. About eight years ago Capt. Brown bought out his brother's interest in the firm, and when the Monongahela River Consolidated Coal & Coke Co. was formed, Capt. Brown sold his property to it. He was interested in a number of other enterprises and was especially fond of horses. He did much to improve the character of horse racing.

At a meeting of the directors of the Detroit Ship Building Co., this week the following officers were elected: Wm. C. McMillan, president; M. E. Farr, vice president and treasurer; E. K. Ketcham, secretary. Mr. W. L. Brown, chairman of the board of directors of the American Ship Building Co. was made a director of the Detroit company. Mr. Frank Jeffrey was made general superintendent.

LAUNCH OF FREIGHTER FRANK C. BALL.

The steel freighter Frank C. Ball, building for the Globe Steamship Co., of Duluth, was launched from the Ecorse yard of the Great Lakes Engineering Works, on Saturday last, Miss Elizabeth Pessano acting as sponsor. Among those on the stand were Frank C. Ball, E. D. Ball, William C. Ball and Dr. L. L. Ball, of Muncie, Ind., Miss Pessano, Mrs. A. C. Pessano, Miss Marjorie Russel, Miss Mary Russel, all of Detroit; James E. Davidson, Bay City; Prof. J. W. Mauck, Hillsdale, Mich.; H. C. Sadler, University of Michigan; W. P. Bloodgood, Milwaukee; Henry B. Ledyard, and W. P. Hamilton, William Livingstone, F. H. Holt, David D. Cady, Frank R. Thrall, Walter Williams, Antonio C. Pessano and John R. Russel. The freighter was named in honor of Mr. Frank C. Ball, of Muncie, Ind., who is one of the principal stockholders in the steamship company. The steamer is 550 ft. over all, 530 ft. keel, 56 ft. beam and 31 ft. deep, and is equipped with triple expansion engines 24½, 39 and 67 in. cylinder diameters by 42 in. stroke, supplied with steam from two Scotch boilers 15 ft. 6 in. by 12 ft. She will carry 10,000 tons of ore.

The keel for the freighter James Laughlin will be laid in the berth just vacated by the Ball. The launch of the freighter B. F. Jones, building in the slip adjoining is scheduled for Dec. 30.

END OF THE LAKE SEASON.

With the transfer of some fugitive cargoes of coal to Lake Michigan ports from Lake Erie docks, on Monday and Tuesday of this week, the season of navigation for 1905 came to an end. One dollar was paid for these belated cargoes. A number of ore carriers left the head of the lakes before noon Sunday, and are now at lower lake docks unloading.

The season has been the most remarkable in the history of the lakes. No such movement of freight has ever been known before; nor even as late as two years ago had anyone a right to look forward to such a movement. It has been handled with consummate ease by both ships and docks, and has really afforded reasonably busy employment to all available ships on the lakes. In fact repeatedly more ships could have been used in some of the lesser trades than were available. Vessel owners, are therefore wise in placing orders ahead for tonnage as they have.

The season, too, was extraordinary in the violence of the elements. The months of September, October and November were marked by three great storms. Each exacted its toll. The two earlier storms did great damage to the old wooden craft, but the last storm seems to have spent its violence on steel ships only. About fifteen of them were beached, one of them foundering and two of them being broken on the rocks. The other twelve were beached and suffered serious damage. In all, 215 lives were lost during the season.

CONTRACTS FOR FIVE MORE STEAMERS.

The Pittsburg Steamship Co. last week gave orders to the American Ship Building Co. for two freighters to be duplicates of the two recently ordered, that is, to be 600 ft. over all, 580 ft. keel, 58 ft. beam, and 32 ft. deep, to come out during 1906. The engines will be triple expansion, 24, 39 and 65 in. cylinder diameters by 42 in. stroke, supplied with steam from two Scotch boilers, 15 ft. 4½ in. by 11 ft. 6 in., equipped with Ellis & Eaves draft. These engines, as will be noted, are the same as are installed in the Wm. E. Corey and sisters. The company does not think it necessary to give the steamers engines of greater power, notwithstanding the recent ex-

perience of modern steamers in the Lake Superior storm.

Mr. W. H. Becker has given an order to the American Ship Building Co. for a steamer to be a duplicate of the one recently ordered by him that is to be 440 ft. over all, 420 ft. keel, 52 ft. beam and 28 ft. deep. She will have triple expansion engines with cylinders 22, 35 and 52 in. diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in. This steamer will be named after Joshua Rhodes of Pittsburg.

The Cambria Steel Co. has also placed orders with the American Ship Building Co., through M. A. Hanna & Co., for two modern freighters, probably of the 600-ft. class, but the exact size of these steamers, together with the dimensions of engines is still in abeyance. The placing of these orders by the Cambria Steel Co. is further evidence of the tendency of ore-producing and ore-consuming companies to own their own vessels. This makes thirty orders that the American Ship Building Co. has for steamers for 1906 delivery. Two of them have already been delivered.

The Grand Trunk Railway Co. has awarded a contract to the Canadian Ship Building Co., Toronto, for the construction of a steel car ferry for service on Lake Ontario. The Great Lakes Engineering Works, of Detroit, will build the engines.

NEW EQUIPMENT ON SANDUSKY ORE DOCKS.

The Macbeth Iron Co., of Cleveland, has received an order from the Pennsylvania lines, for four of the Swedenborg grab buckets of 1½ tons capacity of iron ore, for use on the Pennsylvania ore docks at Sandusky, Ohio. In addition to furnishing these buckets, the Macbeth Iron Co. will rebuild the Excelsior derricks now on this dock, and equip them for the operation of grab buckets.

WHERE IS ERNEST PARSONS?

Information is wanted as to the whereabouts of Ernest Parsons, who was employed on the lakes during the present year. He was last heard from about Oct. 20 last, at Buffalo, but nothing has been heard from him since. It is quite important to have definite news of him and if anyone has information concerning him, please write either to the *Marine Review* or to the State Savings bank, Detroit, Mich.

STEAMER TELEGRAPH.

Editor *Marine Review*: We notice in your issue of Nov. 16, a writeup and picture of the Steamer Telegraph, and it states that she was built in Seattle. We wish to correct you in this statement, as we are the builders of the boat and all her machinery, including the boilers. The Telegraph is the fastest stern-wheel boat on the Pacific coast. She cleaned out everything on Puget sound, and was then taken to Portland, and she beat the best boats there in short order, and is acknowledged by all who see her, to be the fastest stern-wheel afloat.

Respectfully yours,

Everett, Wash. SUMNER IRON WORKS,
J. H. Gillett.

Hollis Burgess, 10 Tremont street, Boston, has sold the cruising sloop Brigand, owned by N. C. Nash, of Cambridge, Mass., to Dr. F. I. Proctor, of Boston; also the knockabout Harelda, owned by James Weld Carret, of Cambridge, Mass., to Joseph A. Will, of Dorchester, Mass.

The Metropolitan Steamship Co., of Boston, has decided to increase the length of the two turbine steamers which it is building at the Roach shipyard at Chester, Pa. from 400 to 420 ft.



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The secretary of war in his annual report to congress, says that during the past fiscal year \$22,383,623.68 have been expended under the direction of the chief of engineers of the war department, in connection with the improvement of rivers and harbors throughout the country. As compared with the fiscal year ended June 30, 1904, this is an increase of \$806,708.83. In addition to this amount the sum of \$2,265,073.69 was expended for work under charge of the Mississippi River Commission. In reference to the appointment of the International Waterways Commission the secretary says that it has been hampered in its work by a lack of clear understanding as to its permanency and as to the actual scope of its duties. For example, in making regulations for the uses of the surplus water at Sault Ste. Marie for power purposes, it seems necessary to provide for joint continuous supervision. The enforcement of rules to be established hereafter at other places or upon other subjects will probably likewise require

joint executive action. It is not clear from the language of the law creating the commission that congress intended to provide for a permanent board. The secretary says that it is desirable that the status of the present commission as a permanent executive board be defined or a new board created. The secretary then reviews the questions which were considered by the commission during the past year on the great lakes.

That Rear Admiral Washington L. Capps, chief constructor of the navy, is not in favor of building vessels in navy yards is again made clear in his annual report just filed in which he repeats his statement of a year ago, that the repairing and over-hauling of the fleet must at all times remain the important work at navy yards, and that in time of war their resources will be taxed to the utmost in performing such work. The Cumberland and Intrepid cannot be constructed at the Boston and Mare Island navy yards within the limit allowance by congress, and an increase of \$40,000 is asked for in the appropriation. Because of the insistence of congress that the colliers Prometheus and Vestal be constructed in navy yards, the chief constructor asks for an increase in the limit of their cost. The chief constructor is quite right in maintaining that the navy yard should confine its attention to repair work. New construction should be given to private ship builders.

President Roosevelt in his message to congress urged the passage of the merchant marine bill in language somewhat more vigorous than previous presidents have employed. The president is in sympathy with the movement to restore the merchant marine of the United States in the over-sea trade. The bill of the merchant marine commission, together with its report thereon, is now before the senate committee on commerce with every prospect of a favorable report to the senate. The bill is similar in principle to that reported a year ago, but embodies some important changes. The most notable of these is the extension of the time when the coastwise law shall apply to the Philippines to April, 1909. The coastwise laws should have gone into effect in April of next year and this makes now the second postponement of their application. The reason given for this action is the lack of American tonnage available for Philippine trade. It is hoped that by 1909 this claim cannot be truthfully made.

An increase is also noted in the subvention to the American Line of \$250,000 between New York and Southampton, and \$217,000 between San Francisco and Australasia. This increased subvention is rendered necessary by the action of Great Britain in granting a new subsidy of \$1,100,000 to the Cunard Line besides loaning that line \$13,000,000 at 2¾ percent for the purpose of building two turbine steamers. The commission in estimating the cost of support to American shipping under the bill says that during the

first year there will be an actual gain in treasury receipts of \$616,750 owing to the increased tonnage tax. The net cost the second year will amount to \$1,667,000; the third year to \$3,532,000, and the fourth year to \$4,282,000.

Summing up the advantages which are to accrue from this outlay, the commission enumerates them as follows:

First—A force of 10,000 naval volunteers—American officers and men of the merchant marine trained to the naval service and holding the same relation to the regular navy held toward the regular army by the present militia and National Guard.

Second—A new fleet of from 200,000 to 300,000 tons of steel mail steamships, the naval reserve of fast transports, ammunition ships, supply ships, colliers, repair and hospital ships, dispatch vessels, etc., described in the accompanying report of Admiral Dewey, as essential to the efficiency of our fighting fleet in war.

Third—A net addition to our cargo (and fishery) tonnage of 1,500,000 tons, increasing fourfold the actual ocean shipping of the United States, and giving us, exclusive of our distinctive lake and coastwise vessels, a merchant marine much larger than the entire merchant fleet of France or Norway, nearly twice that of Italy, and fully twice that of Japan. Such a new merchant tonnage would enable the United States to carry under its own flag not 10 percent, as now, of its own imports and exports, but 30 or 40 percent, earning for our own country, instead of \$20,000,000, from \$60,000,000 to \$80,000,000 a year in freight and passenger receipts.

Fourth—Finally, the creation of ten regular new or strengthened American steamship lines to South America, Central America, Africa and Asia, supplemented by a large and active fleet of "tramp" or cargo vessels, inevitably opening new markets for many thousands of additional bales of American cotton and thousands of tons of grain, flour, provisions, and manufactured goods—a total amount of increased trade and increased employment for the whole American people impossible to state now in specific figures, but certainly fiftyfold or a hundredfold the entire cost of the national subventions.

Accompanying the report of this commission is the report made by Admiral Dewey as admiral of the navy and president of the general board in which he declares that the greatest service which the merchant marine could afford to the navy in time of war would consist of providing fast vessels to be used as scouts and capable of a sustained sea speed of twenty knots. The admiral adds:

The navy would need a number of colliers with a cargo capacity of at least 5,000 tons each, and with sufficient speed and steaming radius to enable them to accompany a squadron of battleships. There should be five such colliers for each squadron of eight battleships, with its attendant cruisers. A number of colliers of less speed and carrying capacity would also be needed for the purpose of keeping the coal supply replenished at the various coal depots and for other purposes. The existence of a large United States merchant marine, from which the colliers could be drawn, especially the fast colliers, would be of great advantage to the navy.

The admiral says that if the United States should go to war when the naval vessels now authorized by congress are completed, the navy department in order to get necessary auxiliaries would be compelled to secure from the merchant marine, 24 scouts, 16 squadron colliers, two slow colliers, five ammunition ships, two supply and refrigerating ships, four tank distilling ships, two hospital ships, four repair and torpedo depot ships, 34 dispatch boats and 78 tugs. In order to be sure that this number of vessels would be available for immediate purchase or charter by the navy department at the outbreak of war, the number of American-owned merchant vessels of each type should be largely in excess of the number he enumerated, as manifestly not all of the country's merchant ships could be turned over to the navy department.

As a matter of fact the United States possesses no

such fleet as is here enumerated at present, nor is it likely to possess one unless the present bill is passed by congress. Admiral Dewey's report therefore adds considerable emphasis to the report of the merchant marine commission, for it proves conclusively that the present condition of the United States is a menace to its permanent security.

HAVE TAKEN UP STEEL SHIP BUILDING.

The Phoenix Foundry & Locomotive Works, St. John, N. B. have within the last year taken up on a small scale the work of steel shipbuilding and recently completed a steel ferry boat for the city of St. John, 140 ft. long over guards, 49 ft. beam over guards and 7 ft. 7 in. draught. The steamer is propelled by a compound engine, having three cylinders, the high pressure 14 in. diameter, the two low pressure 20 in. diameter by 18 in. stroke. There is a propeller about 5 ft. 10 in. diameter at each end of the boat. The boat is finished in first-class style, all the seats and sashes in the cabins being mahogany, and the ferry boat is in fact a duplicate on a small scale of the five ferry boats recently built for New York harbor. The company is now engaged upon the construction of two steel barges 105 ft. long with a capacity of 200 cu. yds.

TRADE NOTES.

The General Electric Company has just received an order from the Chicago Edison Company for two 8,000 Kw. Curtis steam turbines and generators. These machines are each capable of developing 18,000 horsepower. This order is a duplication of one formerly received from the Chicago Edison Company for two similar machines, making a total of four machines for the company.

The New York Edison Company has also recently ordered two machines of this size. These are the largest steam turbines ever designed, the six units referred to being capable of producing a total of 108,000 horsepower. The Chicago Edison Co. just started up its fourth Curtis turbine unit of 5,000 Kw. capacity. This company was the first to install and operate a Curtis turbine of this size.

The National Electric Co., Milwaukee, has just put out two bulletins, one devoted to air compressors and the other to polyphase induction motors. The compressors are especially compact and more than 15,000 of them are now in daily use. The induction motor illustrated is a simple device for the conversion of electric energy into mechanical energy. The absence of parts requiring attention and the favorable structural conditions make this type of motor especially adapted to all conditions requiring constant and severe service.

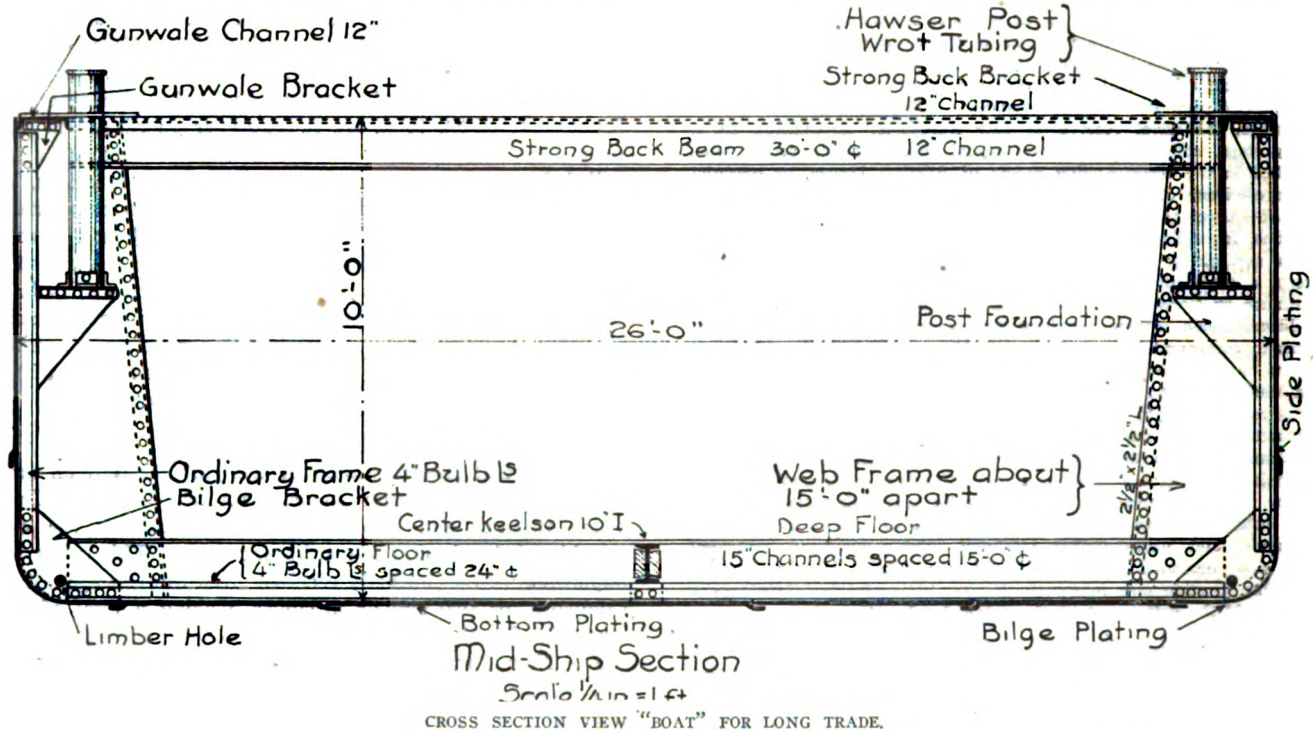
Mr. Russell A. Alger Jr., of Detroit, Mich., has sold his auxiliary ketch Sitarah to Mr. Aemilius Jarvis, the well known Canadian amateur yachtsman, through the office of Stanley M. Seaman, 220 Broadway, New York. The Sitarah is a cruising yacht designed and built by George Lawley & Sons Corp. 1903. Dimensions: 85 ft. o. a.; 25 ft. w. l.; 17 ft. beam; 5 ft. 6 in. draught. Accommodations: Four state rooms, large saloon, interior finish butternut, outside teak. She was built for Mr. J. H. Cromwell of New York, who sold her to Mr. Alger last spring. The latter fitted her with a gasoline motor. She has been delivered to Mr. Jarvis in Toronto who will use her for cruising on the great lakes.

Mr. Henry J. Gielow has prepared plans and specifications for a cabin steam launch for Mr. A. Ahlstrom, Bjorneborg, Finland. This boat is 54 ft. over all, 50 ft. water line, 11 ft. 6 in. breadth and 4 ft. draught and will be built in Finland. Sullivan triple expansion engine, and a Roberts safety water tube boiler will be installed and a speed of about 13 miles per hour will be developed.

STEEL BARGES ON THE OHIO RIVER.

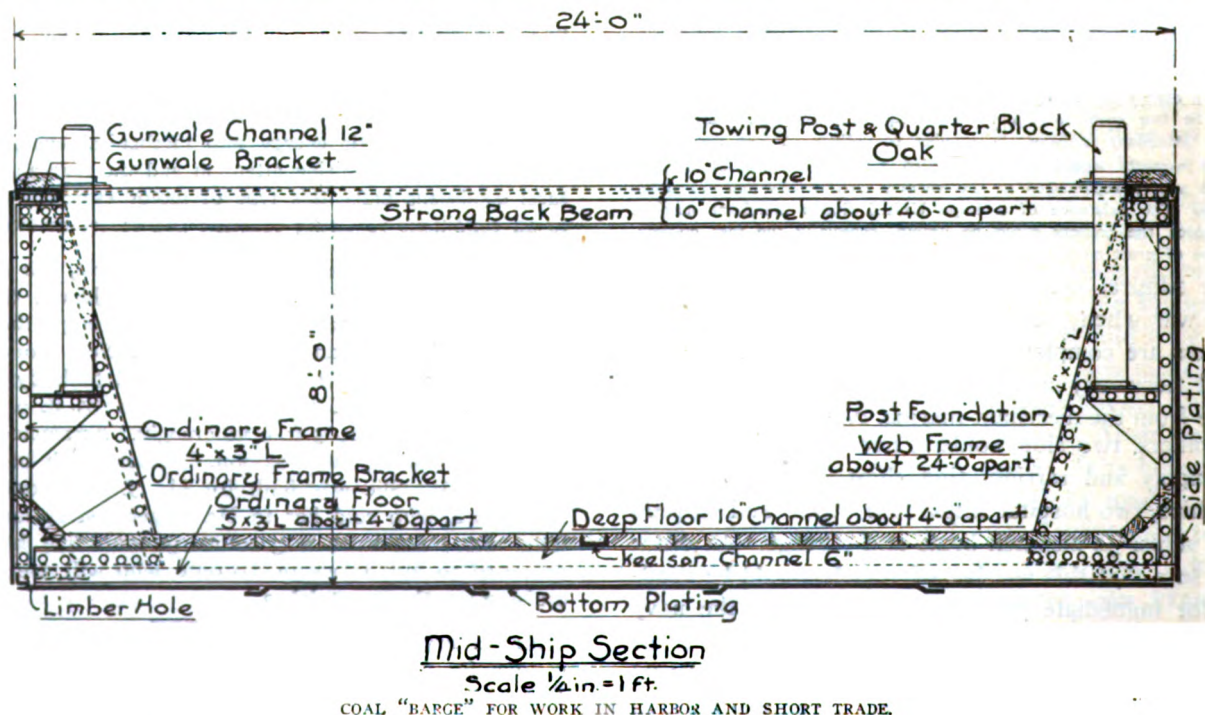
The steel barge on the Ohio river and connecting tributaries is rapidly winning its way into popular favor, not alone on account of the feasibility of this type of construction for the transportation of the enormous tonnage annually carried down the rivers, but also as a matter of economy as well as necessity. At the present time the

the most conservative men in the business have predicted the gradual abandonment of the wooden boats and barges and their displacement by the modern steel hulls. At the present time there are a score of steel barges and hulls on the rivers, and they have been successfully tried out in the short trade between Pittsburg, Cincinnati, Louisville



number of steel barges in use on the rivers is limited and it was not until quite recently that facilities for building these conveyances had been provided to an appreciable ex-

and Cairo, as well as the long trade to New Orleans and Mississippi river ports. Their success in the harbor trade at Pittsburg has been unquestionable. Ten steel barges



tent but results shown from actual experience have so far convinced the leading transportation companies on the rivers of their practicability, utility, economy, that some of

owned by the Steel Corporation have been in use in the transportation of coal and finished material and results have shown them far superior to the old wooden barges

in every respect.

The total navigable mileage of the Ohio river and all its tributaries is about 4,400 miles, the Ohio itself being about 1,000 miles from Pittsburg to Cairo, Ill., where it empties into the Mississippi. The gross freight movement on this vast waterway amounts to about 11,000,000 tons per year, one half of this tonnage being coal from the Pittsburg district. In handling this enormous business there are about 480 steamboats and some 6,000 to 7,000 barges. One corporation, the Monongahela Consolidated Coal & Coke Co., owns upward of 100 tow boats of all descriptions, and 3,000 barges, and handles annually approximately 4,000,000 tons of coal.

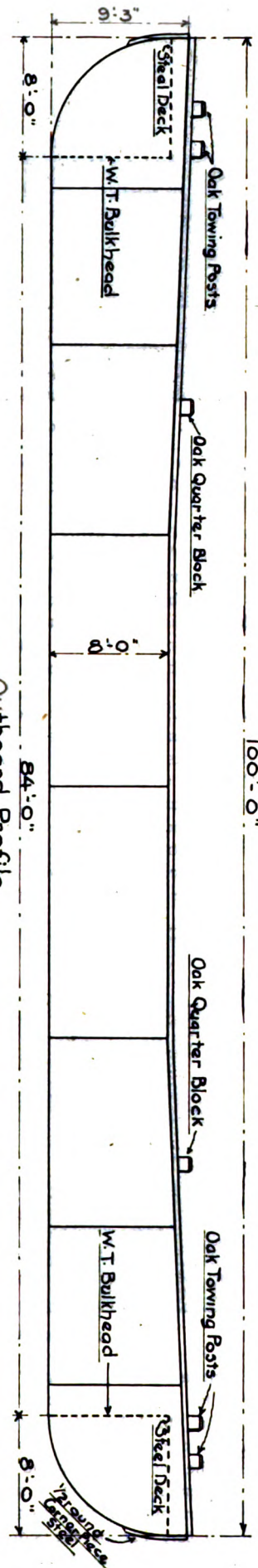
The average life of a wooden barge is estimated at 10 years and of a steel barge, 25 years. The cost of a wooden barge is about 40 percent of the cost of a steel barge. Taking into account repairs, simple interest on investment and the annuity required to replace the investment, and at the same time considering the comparative life of both types, it has been estimated the annual charge for a steel barge is less than for the wooden barge. Upon the relative cost alone owners have figured they are justified in substituting the steel barge for the wooden barge as fast as the wooden barges now in service wear out or are lost. Again, timber is getting scarce, and this feature alone has caused the large owners of barges on the rivers to look into the problem of steel construction. In the long trade, down

the Mississippi to New Orleans the empties are frequently delayed for weeks, or even months, by low water, and the wooden barges are exposed to the sun and atmosphere and dry out so thoroughly that they have to be recaulked before they can again be loaded and as a result the repairs are greater than would be the case with steel barges and the delay in making the repairs often prevents taking advantage of high water to make another trip. Wooden barges often suffer severe damage by ice in winter, entailing charges for repairs and docking time. Steel barges are not subject to expenses entailed, by drying out and practically the only charge for maintenance would be for painting once a year.

There are two types of carriers on the rivers, first, those provided with their own propelling machinery, such as the stern and side wheel steamboats, and second, the carriers that have to be towed, or moved by external means, such as the coal boat and barge or the deck merchandise barge. The final results in any design for a carrier on any waterway system is a compromise between adaptability for certain speed, draught of water available and carrying capacity required, there being, as a matter of course, many other detail considerations peculiar to the service conditions. Passing over the requirements of river steamboats and taking up the subject of barges, the steamboats, aside from the packets, not being designed to carry cargo and the

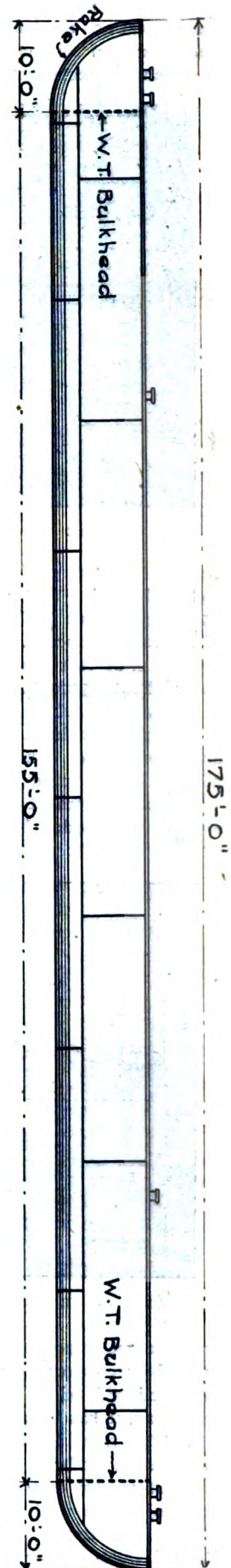
COAL "BARGE" FOR SHORT RIVER TRADE AND HARBOR WORK.

Outboard Profile

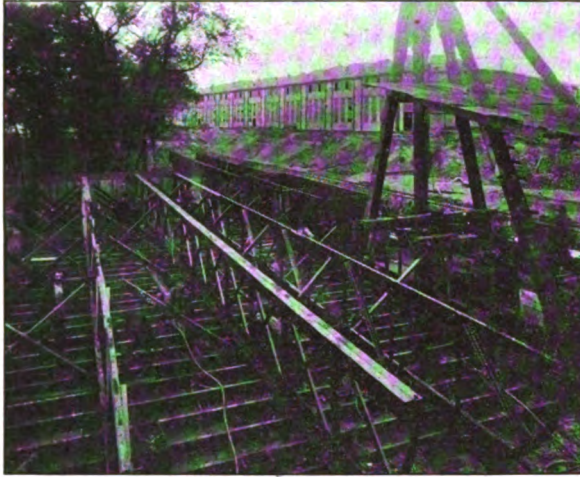


RIVER COAL "BOAT" FOR LONG TRADE, PITTSBURG TO NEW ORLEANS

Outboard Profile



accommodations provided are generally but little in excess of those required by the crew, these barges, used in bulk transportation are divided by the rivermen into two classes known respectively as "boats" and "barges", both of which are rectangular in plan and resemble large open



BARGE IN COURSE OF CONSTRUCTION.

boxes. The "barges" are usually about 135 feet long, 26 feet wide and 8 feet deep and have a capacity between 15,000 and 16,000 bushels or nearly 600 tons on a draught of six feet six inches. The "boats" are usually about 170 feet long, 28 feet beam and 8 feet 6 inches deep and will carry about 25,000 bushels, or 950 tons. The "barge" is strongly and substantially built, is heavily braced and will last a considerable time and is used in the harbor and short trade. The "boat" although larger, is a flimsy affair, and can stand but little hard usage.

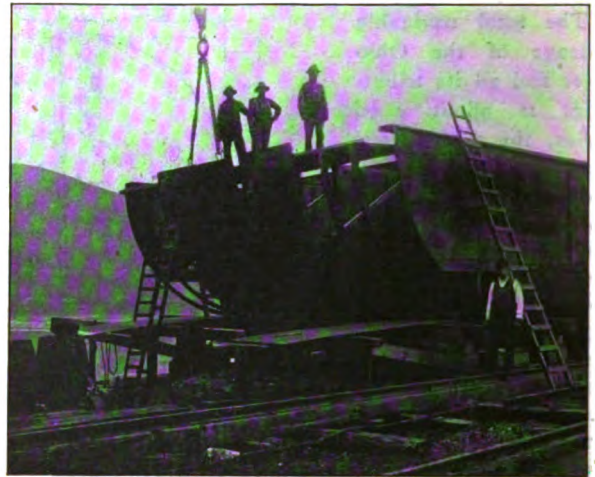
Up to the present time the wooden boats and barges, as well as wooden hulls for tow boats, have held their own on the rivers but with new conditions, steps under



SHOWING FRAME WORK AND BULKHEAD AND SIDE FRAMES.

way for the improvement of the rivers, the lively interest taken by transportation companies in this matter and the promised aid of the government in securing a 9-foot waterway, it has been necessary to look ahead to the time when the river business will again assume its old-time importance, both as a natural outlet from Pittsburgh, the greatest creator of tonnage in the world, and also from a point of economical transportation.

The American Bridge Co., at its plant at Ambridge, Pa., 16 miles below Pittsburgh, on the Ohio river, has attracted wide-spread attention on the rivers by the con-



SHOWING RAKE ON LONG BARGE AND BULKHEAD CONSTRUCTION.

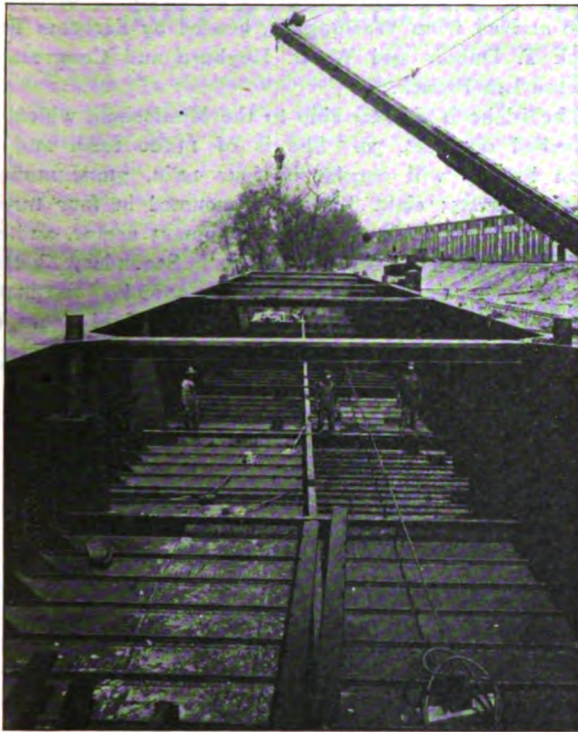
struction of a fleet of steel barges for the American Steel & Wire Co. These barges are completed and in commission and have proven to be more advantageous than the wooden barges, aside from being stronger, better able to withstand the hard usages to which they must of necessity be subjected, and have greatly facilitated the handling of coal between the company's mines and the plants in the vicinity of Pittsburgh. There are ten of them in active service, each 100 feet long, 24 feet wide and 8 feet deep with 15 inch sheer at each end, and constructed of alternate channel and angle frames four feet apart, and with a plank floor laid on the channel frames. It has been demonstrated that with boats of the same size the steel construction will carry about 20 percent more cargo than the wooden boat, and on the same draught of water. On account of their greater strength, too, better dispatch may be secured as the care formerly taken in loading the flimsy wooden boats is not necessary.

The general principle involved in the construction of any type of boat on the rivers is usually embodied in



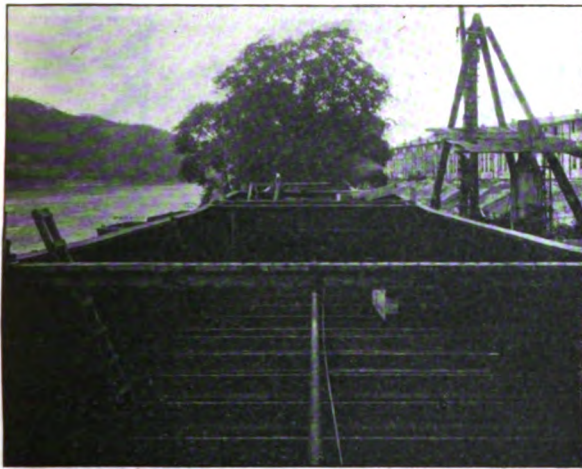
INTERIOR VIEW LONG BARGE.

arranging a longitudinal "back-bone", consisting of longitudinal bulkheads, keelson, and stringers. At right angles to the "back-bone", is arranged a system of "ribs" or transverse members, consisting of floors, side frames, deck beams and cross bulkheads. The steel plating used in the steel barges is $\frac{1}{4}$ in. to $\frac{3}{8}$ in. in thickness and the cross framing or ribs consist of channels and angles, fitted alternately except the side frames, which are angles. A steel watertight bulkhead is fitted at each end of the cargo



SHOWING INTERIOR LENGTH OF LONG BOAT.

space and a steel handling deck is arranged over the bulk-head compartment. In case of collision these bulkheads prevent water from reaching the cargo space and filling

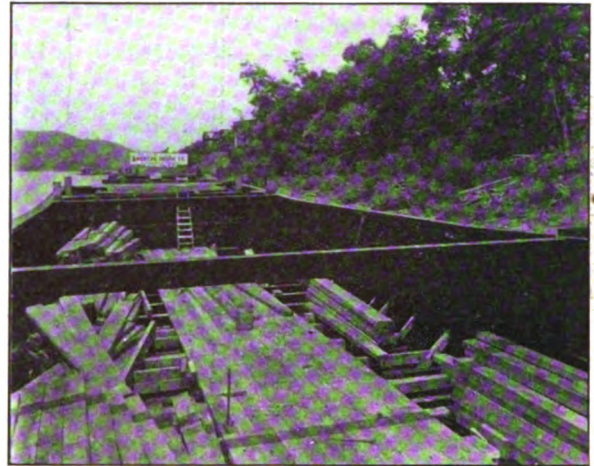


HULL OF COMPLETED BARGE BEFORE LAUNCHING.

the boat or barge. A heavy channel is fitted at the top of the side plating for lateral stiffness and strong beams are fitted across the open cargo space at the quarter blocks, or hawser posts. To facilitate the handling of cargo with clam-shell buckets a wooden flooring, or ceiling, is laid on the channel floor beams, this presenting a smooth surface for the unloader.

The American Bridge Co., has constructed three steel sand barges for the New Union Sand Co., of St. Louis, these being equipped to carry the load on deck, on which is built a sand box, 3 feet 6 inches high, on a crowned deck, and fitted with scuppers to drain the load. The hull of a new packet boat for the Mississippi and Arkansas River Packet Co., is now under course of construction and will be completed in time to go into commission next season. The hull of this boat will be 228 feet long, 44 feet wide and 6 feet 6 inches deep. The packet company

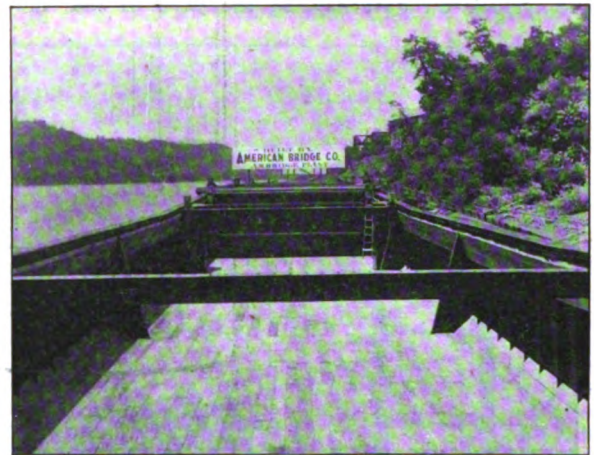
let the contract to James Rees & Sons Co., of Pittsburg, which company sublet the contract for the hull to the American Bridge Co., but will construct the remainder



PUTTING IN DECK PLANKS OF BARGE.

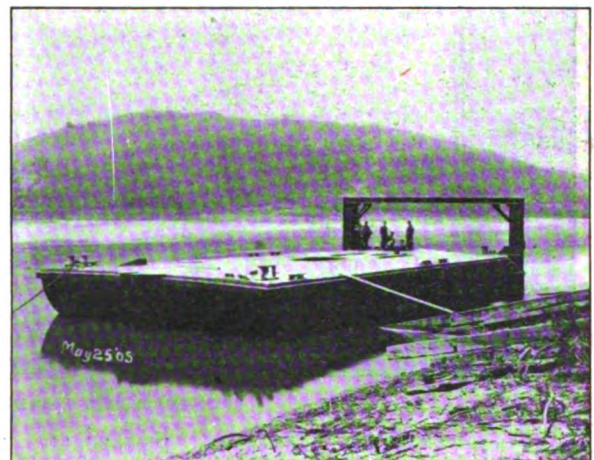
of the boat, including upperworks, boilers, engines and other equipments.

In addition to the work already mentioned the bridge



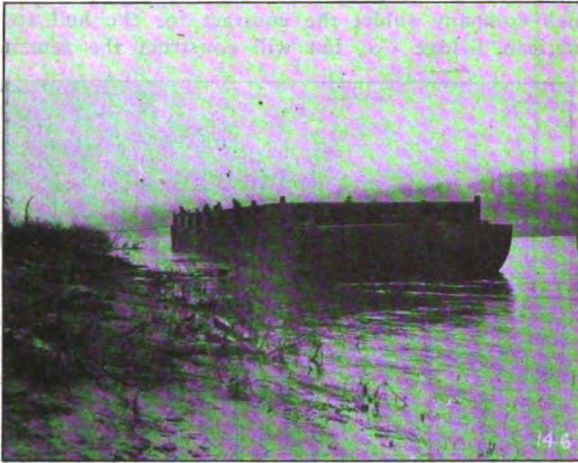
PLANKING IN BARGE COMPLETE.

company last spring launched a large hull which has subsequently been fitted out with special machinery for handling coal and is now in service at New Orleans fuel-



THE COMPLETED HULL.

ing ocean going vessels and is operated by the Monongahela River Consolidated Coal & Coke Co. Dredge



SAND BARGE FOR NEW UNION SAND CO., ST. LOUIS.

hulls for river and coast work have been constructed at the Ambridge plant, which is now at work on several dredge hulls for use in the Panama canal project.

LAUNCH OF BATTLESHIP IDAHO.

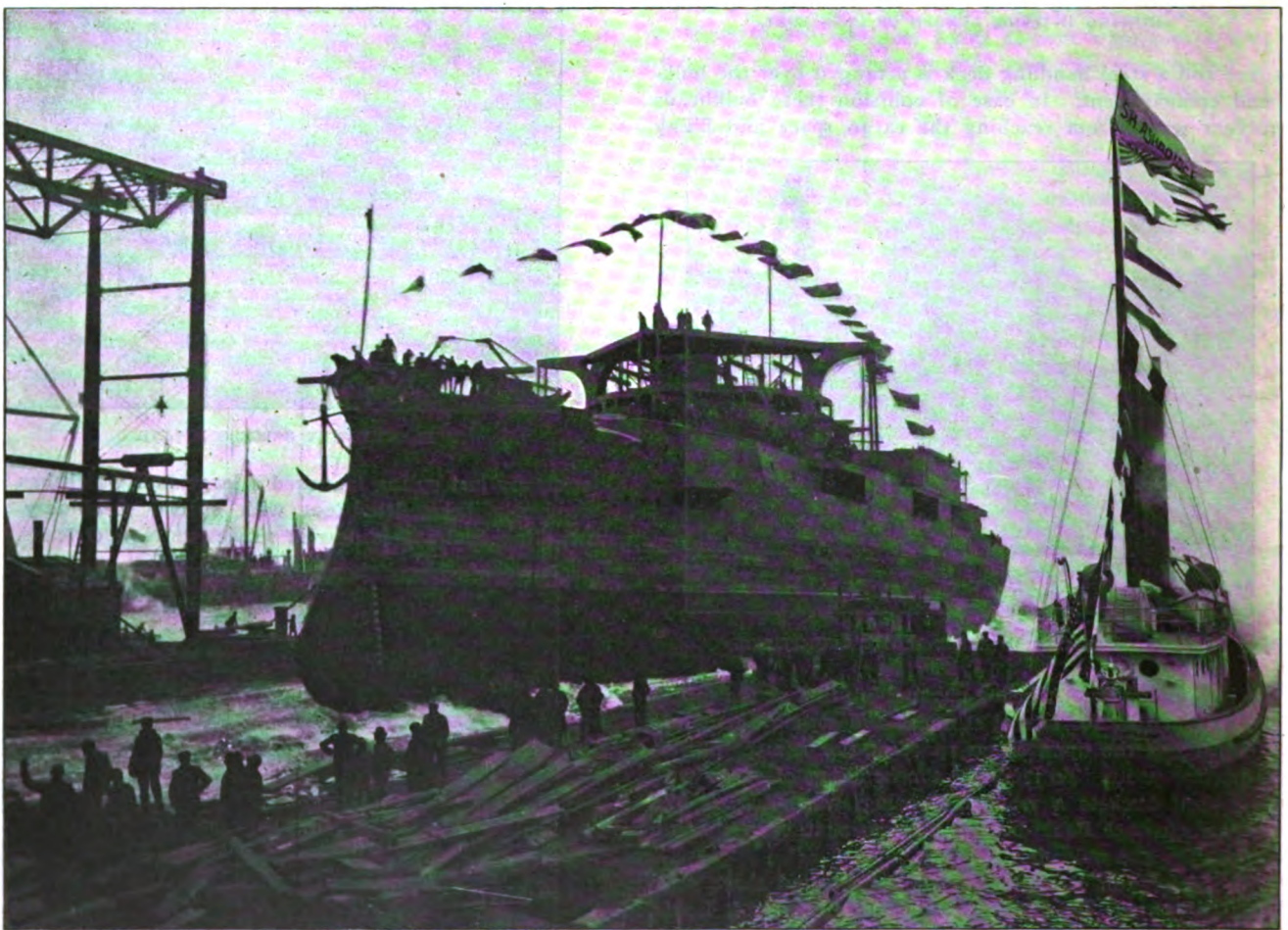
The United States battleship Idaho was launched at 12:20 o'clock on Saturday, at the yard of the William

party, Idaho was represented by a delegation of citizens who arrived from Washington, headed by Senators Frederick T. Dubois and W. B. Heyburn and Congressman Burton Lee French.

The Idaho is a sister ship to the Mississippi, which was launched on Sept. 30. She is of 13,000 tons, and the main battery will consist of four 12-in. guns, mounted in two turrets; eight 8-in. guns, mounted in four turrets; eight 7-in. guns, placed behind casement armor, and two 21-in. submerged torpedo tubes. Secondary battery, twelve 3-in. six-pounders, two one-pounder automatics, two one pounder rapid-fire guns, two 3-in. field pieces, two machine, and six automatic guns.

STEAMER COREY RELEASED.

The steamer Wm. E. Corey, which ran on Gull Island reef during the big storm of Nov. 28, was released on Dec. 10. The steamers Douglas Houghton, Manola and Marina, with the tugs Edna G., Gladiator and E. T. Crosby, were pulling on her when she started. For days the great steamer had resisted all efforts to release her, but when she started she did so very suddenly, and it was necessary for some of the wrecking vessels to manœuvre quickly in order to get out of the way. All the lines were



LAUNCH OF THE BATTLESHIP IDAHO AT CRAMP'S, PHILADELPHIA.

Cramp Ship & Engine Building Co., Philadelphia. The vessel was named by Miss Louise May Gooding, the thirteen-year-old daughter of Gov. Frank R. Gooding, of Idaho. In addition to Gov. and Mrs. Gooding, Col. W. C. Hunter, of the governor's staff, and Chief Justice and Mrs. S. O. Stockslager, who compromised the governor's

broken in the strain of starting the Corey and a sailor on the Marina was caught by a flying line and an arm was broken. The Corey proceeded under her own steam to the head of the lakes where she will be repaired. Her tank top is not injured but it is expected that her bottom is badly ripped.

IMPROVEMENT OF THE OHIO RIVER.

The following is a statement showing the condition of the works now constructing on the Ohio river in the Wheeling, W. Va., district; Dam No. 8. A contract was entered into June 8, 1904, with the T. A. Gillespie Co., of Pittsburg, Pa., for building the lock and guide walls. Under this contract work was commenced July 1, 1904. The condition of the work on Sept. 30, 1905, was as follows; 120 linear feet of land wall, the entire river wall, and 235 linear feet of upper guide wall were completed. The paving for the lock chamber was commenced.

Dam No. 11. On June 30, 1904, a contract was entered into with the Aetna Construction Co., of Wheeling, W. Va., for building lock and guide walls. Work at this site was commenced on July 16, 1904. The following was the condition of the work on Sept. 30, 1905: 315 linear feet of land wall, walls for lower gate recess, and 45 linear feet of lower guide wall were completed.

Dam No. 13. Work on the lock walls and part of the guide walls was commenced Aug. 1, 1901, under contract with the Sheridan-Kirk Contract Co., of Nicholasville, Ky. The sandy character of the river bed interfered to some extent with the progress. On Sept. 30, 1905, the following condition of the work existed: The land and river walls were entirely completed, 56 linear feet of the lower guide wall in place, and the paving of the lock chamber well under way. Considerable filling is still to be placed back of the land wall.

Plans for the dam were practically completed, and the work will be advertised during November.

Dam No. 18. The Evansville Contract Co., under its contract entered into November 21, 1902, for building lock and guide walls, has practically completed all the work required thereby.

A contract was entered into May 18, 1905, with the Baker Contract Co., of Pittsburg, Pa. for constructing the dam. Considerable excavation has been done, and some concrete for the foundation of the dam placed.

Dam No. 19. The land required for this site has been purchased. The requirements of the last river and harbor act made it necessary to suspend work at this site.

CONDITION OF OHIO RIVER WORKS.

Editor *Marine Review*:—In response to your inquiry of the 20th instant, I beg to give you the following statement of condition, etc., of Ohio river works in this engineer district:

LOUISVILLE AND PORTLAND CANAL.

This canal proper is about $2\frac{1}{4}$ miles in length and 90 ft. in width. The locks consist of two chambers, in flight, with a total lift of about 26 ft., each of the chambers having an available length of 350 ft. and width of 80 ft. Throughout a distance of about 1,000 ft. above the locks, the width of the canal is about 210 ft., and, beginning about 725 ft. below the railroad bridge at Fourteenth street, the width is abruptly increased from 90 ft. to 210 ft.; this latter width is then gradually increased through a distance of nearly 2,800 ft. to 325 ft. at the head of the canal proper, at which point the enlargement is expanded into a capacious basin or harbor 800 ft. wide and practically parallel to the Kentucky shore.

A dry dock is located near the locks and will accommodate vessels not exceeding 225 ft. in length and 54 ft. beam. When not in use for the construction and repair of government boats, the dock is available for use by private parties at very reasonable rates.

DAMS.

The dam across the river at the head of the "Falls of the Ohio," consists of about 800 ft. of movable dam of the Boule type immediately north of the head of the new north canal

wall opposite Ninth street, thence a section of fixed concrete dam extending to the south abutment of the Middle Chute opening on the cross dam; in this latter opening is located 500 ft. of movable dam of the Boule type; north of this 500-ft. opening is, at present, a section of crib dam about 1,000 ft. long, immediately north of which is another section of Boule dam about 160 ft. long, located in what is known as the Indiana Chute opening, the total width of which is about 625 ft.; north of this opening the dam is of fixed crib work. The crest of the first two sections of the present dam corresponds to 8 ft., upper canal gauge, that of the other sections to 5 ft. on the same gauge.

IMPROVEMENTS, INDIANA CHUTE.

This is the main channel of the Ohio river over the falls. The object of its improvement is to make it safely navigable for descending traffic when the stage of the river is at or above 8 ft., upper canal gauge, by providing a good channel 400 ft. wide between the cross dam and the railroad bridge, the excavation of the rock reefs some distance below the railroad bridge, known as Wave Rock and Willow Point, and the construction of stone contracting dikes at each of these places. The excavation and both of the dikes mentioned have been completed. The dike at Wave Rock is about 2,300 ft. long, that at Willow Point 1,250 ft. long, and together with the excavation afford a depth of practically 8 ft. over the two reefs when the upper canal gauge reads 8 ft. The depth above the bridge is not yet satisfactory, but plans for further work on that part of the channel have already been approved as described below:

COST OF WORKS.

The cost of the improvements including expenditures made by the Louisville and Portland Company and the purchase of stock, payment of bonds, etc., by the United States is as follows:

Enlargement between old and new locks.....	\$ 133,000.00
Automatic gate	6,050.00
Enlargement at head of canal (incomplete)....	1,450,000.00
(approximate cost, as estimated)	

1,589,050.00

The total cost of work done by the Louisville and Portland Canal Co. is as follows:

Expended on original canal.....	\$1,019,277.09
Expended on subsequent improvements and construction	120,000.00
Expended for enlargement of canal.....	1,825,403.00

2,964,680.09

The total cost to the United States is as shown below:

Original stock	\$ 233,500.00
Appropriations for enlargement and extension of original canal	1,463,200.00
Canal bonds paid	1,172,000.00

2,868,700.00

Deduct dividends paid to United States by canal company	257,778.00
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Net cost

Expended by United States subsequent to assuming full control:	2,610,922.00
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For enlargements, etc.....	\$1,589,050.00
For operating, care, etc.....	1,937,941.38

Total

FURTHER IMPROVEMENTS.

At present there is under construction 1,000 feet of movable dam of the Boule type to replace that portion of the old fixed crib dam between Middle and Indiana chutes. The height of this new section of dam is such as to permit its

being kept up until a stage of 9 feet upper canal gauge is reached.

Plans have been approved for additional work on the Indiana chute channel so as to force sufficient water into the chute to make the desired depth throughout.

Briefly described, this additional work will consist of concrete contracting dikes and submerged dams, so arranged as to control and distribute the water taken into the chute at its head.

In the harbor at the head of the canal there remains to be done a very considerable quantity of rock excavation, in order to secure the prescribed depth within the projected lines. The following statement indicates the items of work, so far projected and remaining to be done, as well as the estimated cost thereof:

WORK AT LOUISVILLE.

A detailed statement of the amount required for completion of all the work so far projected and approved but not yet provided for based upon late surveys, follows:

18,862 cubic yards earth excavation.....	\$ 15,337.05
13,247 cubic yards solid rock excavation, at head of canal	36,706.51
3,801 cubic yards new south wall.....	22,804.80
2,306 square yards slope revetment.....	5,322.83
1,736 cubic yards old wall and guard gate abutment to be removed.....	1,052.70
20,095 cubic yards disrupted rock to be removed..	31,702.45
2,500 cubic yards submerged dam at Whirlpool Point	7,500.00
22,300 cubic yards longitudinal contracting dikes..	267,600.00
3,000 cubic yards submerged dams below railroad bridge	60,000.00
3,200 cubic yards excavation, Indiana Chute....	11,200.00
600 linear feet Boule dam to be raised.....	2,500.00
Contingencies	46,921.74
	<hr/> 509,548.08

ADDITIONAL WORK RECOMMENDED BY THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS BUT NOT YET ADOPTED BY CONGRESS.

500 feet Boule dam across Middle Chute	\$ 37,500.00
650 feet Chanoine wicket dam, including abutments, service bridge, etc.,	130,000.00
600 feet concrete dam, north of Indiana Chute.....	15,000.00
Contingencies	36,500.00
	<hr/> \$219,000.00
	<hr/> 728,548.08

H. BURGESS,
Captain, Corps of Engineers.

BENEFITS OF IMPROVED RIVER NAVIGATION.

Editor *Marine Review*:—There is no doubt that the people at large know too little about the river and harbor improvements of the United States in general and the Ohio river in particular. My own views concerning the value of the Ohio river improvement are briefly but very plainly stated in my official reports published in the annual reports of the chief of engineers, Ohio river improvements, Cincinnati office, from 1897 to 1901, by which the slack-water navigation of the Ohio river was extended from Beaver river down to below Cincinnati, and the slackwater improvement of the Big Sandy river was commenced.

The great benefit of such improved navigation to the Ohio river valley is beyond comprehension by the average public. While the construction of locks and dams Nos. 2, 3, 4, and 5 was in progress on the upper river between 1897 and 1901, mainly under my direction, the rise of value in the landed property on one side alone of the Ohio river, due to the prospect of early completion of these dams, amounted to as much as the entire cost of completion of the four dams. This result was reached even before navigation was completed, and so was irrespective of and in addition to the probably equally great benefit which would afterwards result to navigation interests from the improvement of navigation. My own 4 years' experience in charge of the Ohio river improvements, including

at one time everything from below Pittsburg down to Cairo—1,000 miles of river—makes me confident that this valley has exceptional advantages for becoming the future workshop of the United States, and that the varied industries of Pittsburg will gradually extend down the river to Cairo and perhaps down the Mississippi to New Orleans, whenever and as fast as the improved navigation of the river will allow coal and other fuels to be sent down the river in barges without stoppage during the entire twelve months of each year.

During a seven years' tour of duty on the south Atlantic coast, from 1884 to 1891, the government expenditures for river and harbor improvements showed for every dollar once spent by the United States a return of 100 per cent per year for many years thereafter, in the saving of transportation charges, increased imports and exports, and development of communities and industries which resulted from the extension of the radius of profitable transportation. I see no reason why similar results should not be reached in the next ten or twenty years in the Ohio river valley, even though the cost of slack-water improvement from Pittsburg to Cairo should amount to as much as \$80,000,000 to \$100,000,000. I do not see how the people of the Ohio and Mississippi valley can afford, in their own interest and that of the country at large, to do otherwise than urge the necessity and final economy of extending a continuous 9-foot navigation throughout the entire year and over the full length of the river from Pittsburg to New Orleans.

W. H. BIXBY.

Lt. Col., Corps of Engineers.

AROUND THE GREAT LAKES.

Efforts are being made to dispose of the property of the Port Huron Ship Building Co., of Port Huron.

The first of the two 10,000-ton steamers building at the Bay City yard of the American Ship Building Co. for the Gilchrist Transportation Co., of Cleveland, will be launched Dec. 23.

The steamer Wm. G. Mather, built by the Great Lakes Engineering Works, underwent her trial trip last week, and proved eminently satisfactory in every particular. She will winter at the Ecorse yard of the company.

In his report to the United States inspector of steam vessels at Duluth, Capt. R. W. England, of the steamer England, says that she was literally blown out of the water and up on the beach. Repairs to her will amount to about \$60,000.

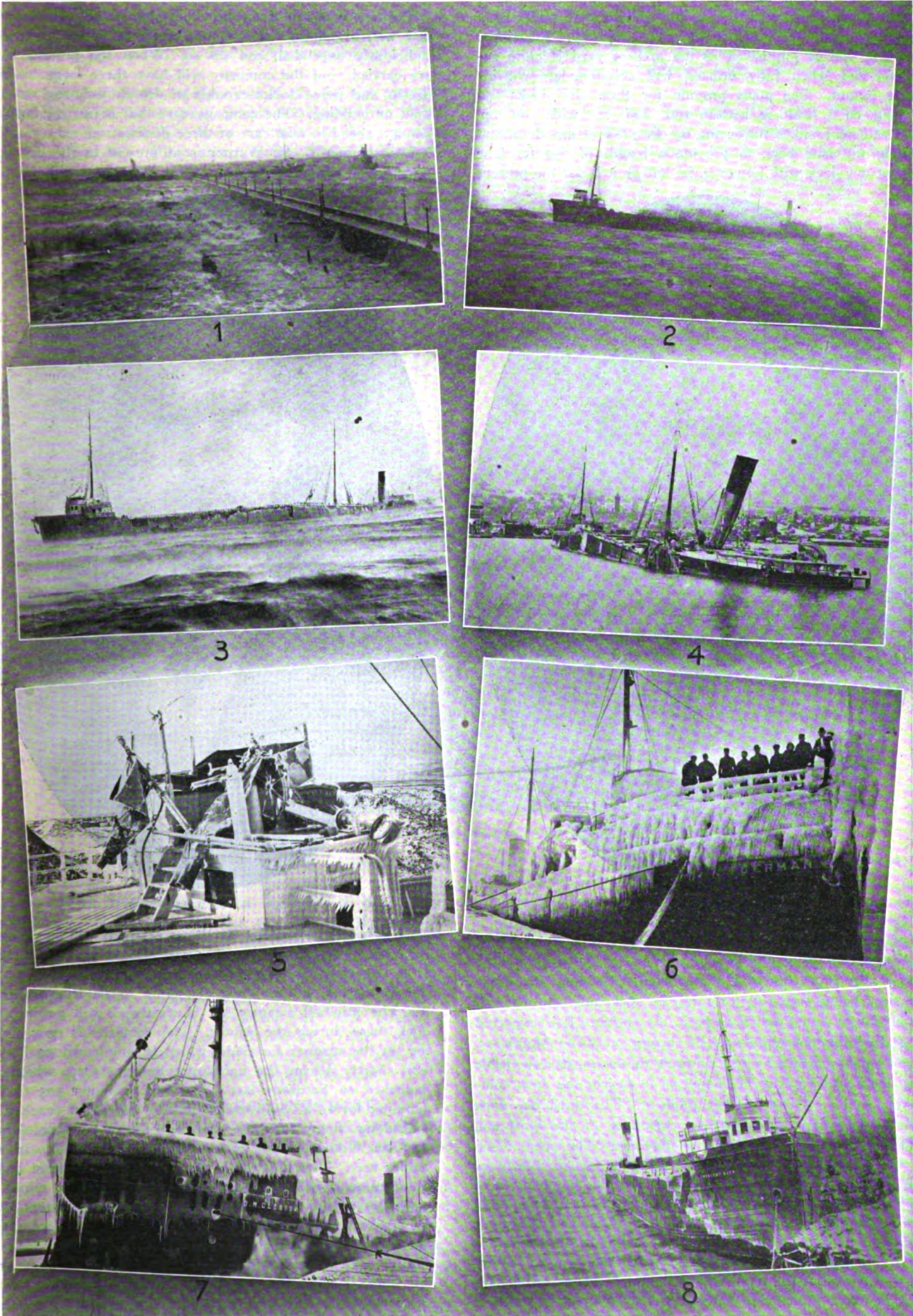
The steamer Thomas Davidson was seized last week at Buffalo, to satisfy a claim of M. J. Cummings, of Oswego, owner of the steamer Western Star who wants \$500 for service rendered in attempting to release the Davidson from Point Iroquois Shoals, Lake Superior, on May 25.

The whaleback steamer James P. Colgate struck the little schooner J. Duvall last week off Tashmoo park. The schooner struck so hard that her spars were thrown out and she is a total wreck. The crew escaped in a small boat. The Colgate had later to be beached in order to prevent her from sinking.

The operating department of the Baltimore & Ohio railroad has just closed a contract with the McLean Contracting Co., Baltimore, for the construction of a mammoth pier at Locust Point. The new pier will be 975 ft. long and 160 ft. wide. It will be a double deck construction, having two tracks for trains below and two above. The pier will be built on piles with a concrete foundation.

The firm of Yarrow & Co., will remove their ship building plant from the Isle of Dogs to either the Clyde or the Tyne.

LAKE SUPERIOR'S LATEST STORM,



1. The Mataafa thrown against the pier of the Duluth ship canal. 2. The waves breaking over the Mataafa. 3. Showing the cracks in the Mataafa. 4. Wreck of the Mataafa. 5. Pilot house of the Umbria. 6. The German after the battle. 7. The Clemson after the storm. 8. The Crescent City ashore at Lakewood near Duluth.

TOLEDO SHIP BUILDING CO.'S PLANT.

The Toledo Ship Building Co. of Toledo, is taking hold of the Craig plant with a vim and already has under way elaborate plans for increasing its capacity. Additional land will not be purchased as the present yard is quite capacious and when fully utilized will accommodate considerable output. The plans provide for three dry docks 650 ft. long, 80 ft. wide at bottom and 120 ft. wide on top. This will necessitate timbering up the present dry dock and moving the gate back to provide a length of 650 ft. The present dry dock will, however, be left as it is for the present

ed cantilever fashion to handle material over the dry docks as well as over the building berths.

The new company finds the Craig plant to be well equipped and well organized but will modernize it as far as money, judiciously expended, can do so. When the present plans are carried out the company will have three large building berths and three docks capable of accommodating vessels, built or building. The company says that it can see business enough ahead to take care of three docks.

The steamer C. M. Warner is at present in the dry dock undergoing extended repairs. Over 130 plates will have to



MR. LYMAN C. SMITH.

to accommodate immediate business. The first thing to be done will be the conversion of one of the launching slips into a dry dock by lengthening and deepening it. Plans are now being prepared for this dry dock and contract will be let for its construction early in the spring. It is expected that dredging operations can be begun on it by March 15. The company will give the contract to the most responsible dry dock contractor to be found, as it desires the dock completed at the earliest possible moment. The third dry dock will be located at the northern extremity of the yard and will enter the river slightly on a diagonal. The present slip at the southern end of the yard, which is owned jointly by the elevator company and the ship building company, will be filled in, in order to provide room for a building berth, 100 ft. wide for the construction of car ferries and passenger boats. The tool shop, which is at present located between the building berths running parallel with them will be removed to the head of the building berths and will run at right angles to them. This will facilitate the assembling of material by gravity. The arm of the traveling cranes will be extend-



MR. H. S. WILKINSON.

come off, and twenty-five to thirty of them will have to be renewed. The repairs upon her will amount to about \$40,000. It is expected that she will be out about Jan. 1, and then the Penobscot will go into dry dock to be lengthened 96 ft. The Mitchell steamer W. H. Gratwick will go into dry dock there during the winter. The company is now finishing up the steamer Lakeside, which is lengthened 20 ft., and will shortly deliver the lighthouse tender Aspen, which was launched on Saturday last. The bulk freighter 505 ft. long building for L. S. Sullivan, of Toledo, has about reached the launching stage, and the passenger boat building for the Indiana Transportation Co., Michigan City, Ind., is well under way. This steamer is 285 ft. long, 40 ft. beam and 16 ft. deep, and will be equipped with four-cylinder triple expansion engines, 30, 48, 56, and 58 in. cylinder diameters, by 40 in. stroke, supplied with steam from seven Scotch boilers, 11½ ft. by 12 ft., allowed 200 lb. pressure. The new company faces the future with very bright prospects. Its yard is most conveniently located, having switch connections with twenty-four railways, and with a certainty of considerable patronage from financial interests associated with it. The Cham-

ber of Commerce, of Toledo, tendered a banquet on Tuesday evening of this week, to Alexander McVittie, president; Charles B. Calder, general manager; Howard I. Shepherd, cashier; Frank E. Kirby, consulting engineer; H. S. Wilkinson, secretary, and L. C. Smith, vice president and treasurer.

Mr. Lyman C. Smith, of Syracuse, N. Y., the vice president and treasurer of the company, is also president of the United States Transportation Co., operating twelve modern steamers on the great lakes. He is also president of the L. C. Smith

nington which was wrecked through the explosion of her boilers. About \$3,000 has already been collected.

The new steam schooner Frances Hyde, built at Bath, Me., is owned by The Benvenue Granite Co. of 41 Park Row, New York city. The engine was designed by W. I. Babcock. She is equipped with a Roberts Safety water tube boiler.

The Pacific Coast Steamship Co., San Francisco, will open bids on Dec. 26, for the construction of a steel passenger and freight steamer capable of accommodating 300



THE LITTLE COVE INTO WHICH THE CRESCENT CITY WAS BLOWN BY THE STORM.

Transit Co., which has one steamer in commission and another on the stocks. He is a business man of vast interests, being president of the L. C. Smith & Bros. Typewriter Co., of Syracuse, N. Y.; president of the Portland Cement Co., Hudson, N. Y.; president of the Rochester, Syracuse and Eastern Railroad Co.; president of the executive board of the Halcomb Steel Co., Syracuse, N. Y.; president of the National Bank of Syracuse, Syracuse, N. Y., and first vice president of the board of trustees of the Syracuse University. He was a member of the electoral college of the state of New York in 1896, when Wm. McKinley was elected president.

ITEMS OF GENERAL INTEREST.

Beginning March 15, the Northwestern Steamship Co. will place three fast steamers on their run between Seattle and Seward, Alaska.

The steamer Tempest was partly destroyed by fire while lying at a dock in Detroit last week. The steamer is owned by the Grace Harbor Lumber Co.

The Union Iron Works, San Francisco, recently completed repairs on the steamship Alameda and she has resumed service on the San Francisco-Honolulu run.

Money is being collected on the Pacific Coast to erect a memorial in memory of the crew of the gunboat Ben-

nington which was wrecked through the explosion of her boilers. About \$3,000 has already been collected.

United States Inspectors Bolles and Bulger, of the steamboat inspection service, of San Francisco, have rendered a decision in the case of the collision of the steam schooner Nonpareil and the lighthouse tender Madrone, exonerating both vessels from blame.

The 40 ft. cruising launch Lucy A. has been sold by Mr. George Focht of Hoboken, N. J., to Dr. J. R. M. Dillon of New Orleans, La., through the office of Stanley M. Seaman, 220 Broadway, N. Y. She has been shipped by rail and will be enrolled in the Southern Yacht Club, of which Mr. Dillon is a member.

Engineer Commander Tompkins, the author of "A Text Book on Marine Engineering" the second edition of which was recently published, was chief engineer of the Porpoise when Britain and the United States joined forces in Samoa during the troublous times of 1898-99. He received the thanks of the admiralty for the report on Italian naval manouvers in 1893. He is the author of engine room watch bell for H. M. Ships and a text book on marine engineering, 1896. He joined H. M. Marlborough as royal naval engineer student 1875, making this twenty-six years of naval service.

BOOK REVIEWS.

"Houseboats and Houseboating" is the title of a work by Albert Bradlee Hunt which has just been published by the Forest & Stream Publishing Co., 346 Broadway, New York. This is a book of 216 pages, 9 by 12 in. and is most sumptuously illustrated throughout with line drawings and photographs of actual houseboats, together with scenes of the places where houseboating is most popular, both in this country and abroad. The author says that his purpose in writing the book is threefold: To make known the opportunities that American waters afford for enjoyment of the houseboating life; to present in an adequate measure the development which houseboating has attained in this country; and chief of all, to set forth the qualities of the houseboat in such truthful picturing that a larger number of people may be prompted to prove for themselves its advantages and delights. The houseboat already has a place on many waters of the United States from Casco Bay to the Golden Gate and from the St. Lawrence to Lake Worth. It is constantly increasing in popularity, for houseboating is both simple and domestic. In it are combined home life and life on the water. In England houseboating has been popular for a great many years and the houseboats on the Thames are well known in literature. The author says that from the standpoint of natural advantages for houseboating the Thames is not to be compared with Long Island Sound, the Hudson or the Connecticut. He is quite right, but the fascination of the Thames does not lie in natural beauty. Like London, it is the element of association that makes it fascinating. The houseboater on the Thames looks out on towers that are hoary with history and upon cathedral spires whose bases extend almost to the very foundations of the church itself. In no place along the Thames is one divorced from the great human element. This book will be found of exceeding value to anyone contemplating building or buying a houseboat. Even if it had no other side, its pictorial quality would make it well worth the price asked for it. It is really a most credible specimen of the printer's art. The book is for sale by the *Marine Review*. Price \$3.00.

The D. Van Nostrand Co., New York, has published a book entitled "Practical Matters in Modern Navigation" by Conte de Miremont. The work is designed for the ready solution of the daily problems at sea. Its object is to supply the navigator with a handy work of reference containing a series of simple, concise and accurate methods by means of which he will be enabled with the fewest possible figures to determine the ship's position, whether navigating in sight of land or by observation of the heavenly bodies. The time gained by a knowledge of these brief methods is frequently of inestimable value to the navigator who, owing to surrounding circumstances, finds it imperative to fix his position as soon as possible; and it is incontestable that the fewer the figures used in a calculation the less liability there will be to error. The work is for sale by the *Marine Review* at \$1.60.

"The A. B. C. of Compass Adjustment" is the title of a book by E. W. Owens, published by the D. Van Nostrand Co. of New York. In this book Mr. Owens has put in simple language the substance of lectures delivered by him during a period of five years at the Liverpool Nautical College to special classes of students composed of compass adjusters, masters, mates and others interested in compass work. He observed that it was difficult for the student to understand the magnetism of iron vessels and the compensation of the compass as explained in the text books, and therefore has written this book to supply the knowledge in similar form. It is quite an original

treatment of a complex subject. The book may be had from the *Marine Review*. Price \$2.

The Exporter's Encyclopedia, published by the Exporter's Encyclopedia Co., 65 Duane St., New York, is out. This is a most invaluable guide to shippers. If the instructions given in the book are followed an experienced shipper can make a shipment to any foreign country without having to ask a question as to packing, marking, shipping routes, or documentation. The book covers fully every detail relative to foreign shipping. The price is \$3. It may be had from the *Marine Review*.

NEW NAVAL DRY DOCK NEEDED.

Provision for construction of a dry dock at Pensacola, Fla., capable of accommodating the largest ships in the navy is urged by Rear Admiral W. L. Capps, chief constructor of the navy, in his annual report made public at the navy department last week. The necessity for a large dock at this point arises, it is pointed out, from the strategic importance of Pensacola.

Regarding docking facilities elsewhere on the Atlantic coast, the chief constructor says there are only two docks on this coast in which it is possible to dock large battle-ships and cruisers, and that until those under construction at Portsmouth, N. H., New York, League island, Norfolk, Charleston and Mare island are completed, the work of the bureau of construction and repair is performed at a disadvantage.

The report says that while it was expected that the cost of the construction of the Connecticut in a navy yard would exceed the contract price of the Louisiana, her sister vessel, under construction at the Newport News Shipbuilding and Drydock company, every effort is being made to keep the cost within the limit fixed by congress, and it is hoped that it will not be necessary to recommend an extension of the limit of cost in this case. The date of completion of the two vessels will not differ to any considerable extent.

The report reiterates that "the repairing and overhauling of the fleet must at all times remain the important work of navy yards, and in time of war their resources will be taxed to the utmost in performing such work." Inability to complete the Cumberland and Intrepid within the limit of cost at the navy yards at Boston and Mare island, the report states, makes necessary a request for an increase of \$40,000 each in the limit of cost of these two ships. Because of the insistence of congress that the colliers Prometheus and Vestal be constructed in navy yards, the report calls for an increase in the limit of their cost.

Regarding the development of navy yards this recommendation is made:

That for each navy yard a general plan of development of the yard as a whole should be prepared as soon as practicable by a board composed of the commandant, the heads of the working departments and such other officers not attached to the yard as the secretary of the navy may consider it advisable to assign to such duty, such plans when finally considered and approved by the department and bureaus concerned to be subject only to such minor changes as may be necessary in view of new conditions which may have arisen.

The report calls attention to the expediency of sending the ships on the Asiatic station home in divisions or squadrons to navy yards on the Pacific coast for repair when in need of repairs. "It is believed," the chief constructor adds, "that the effect, both on the personnel and material, would fully justify such an arrangement, and the opportunity for drill and the experience gained from such long distance trans-oceanic cruising would be quite as great as that obtained from short cruises in Asiatic waters."

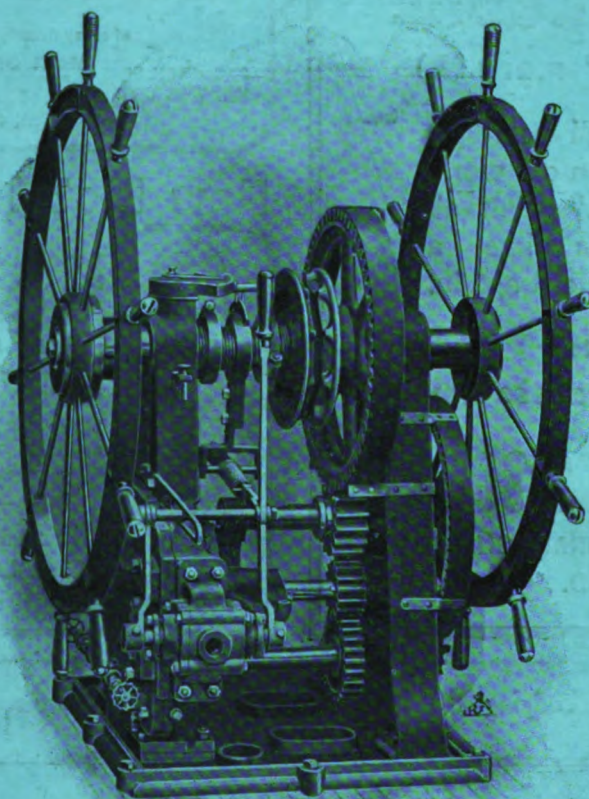


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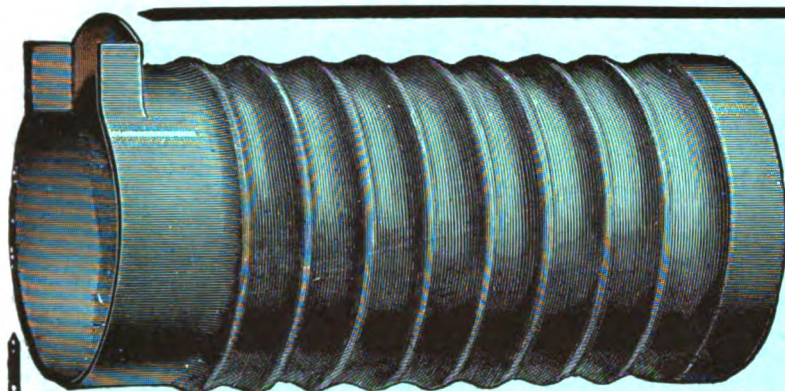
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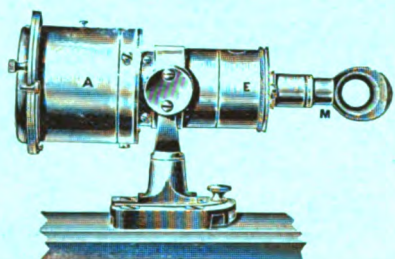
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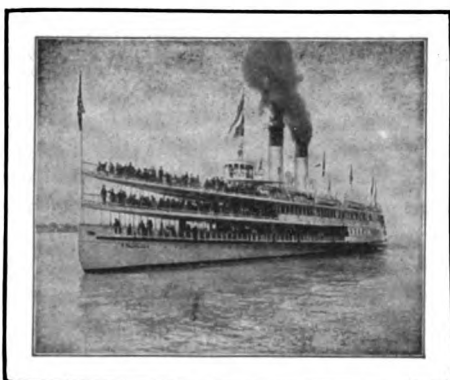
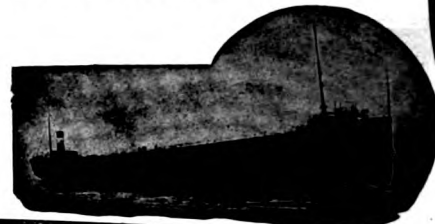
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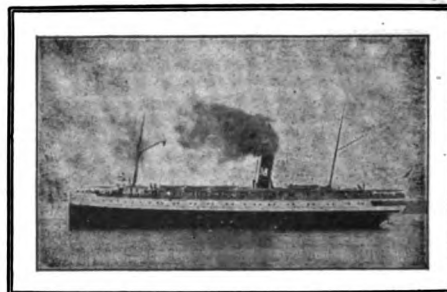
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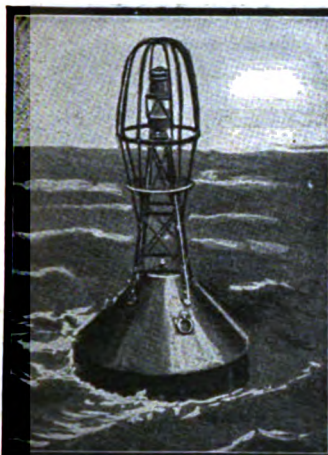
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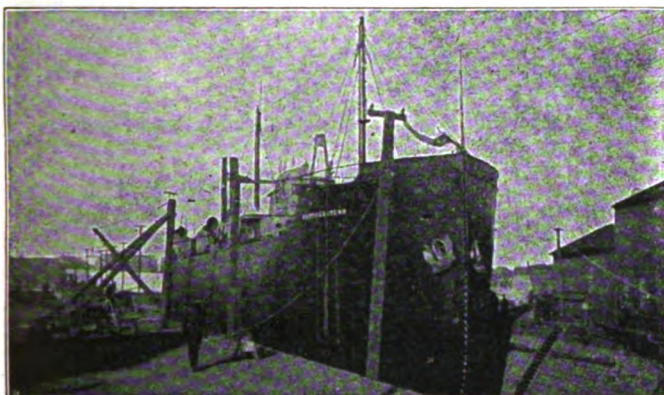
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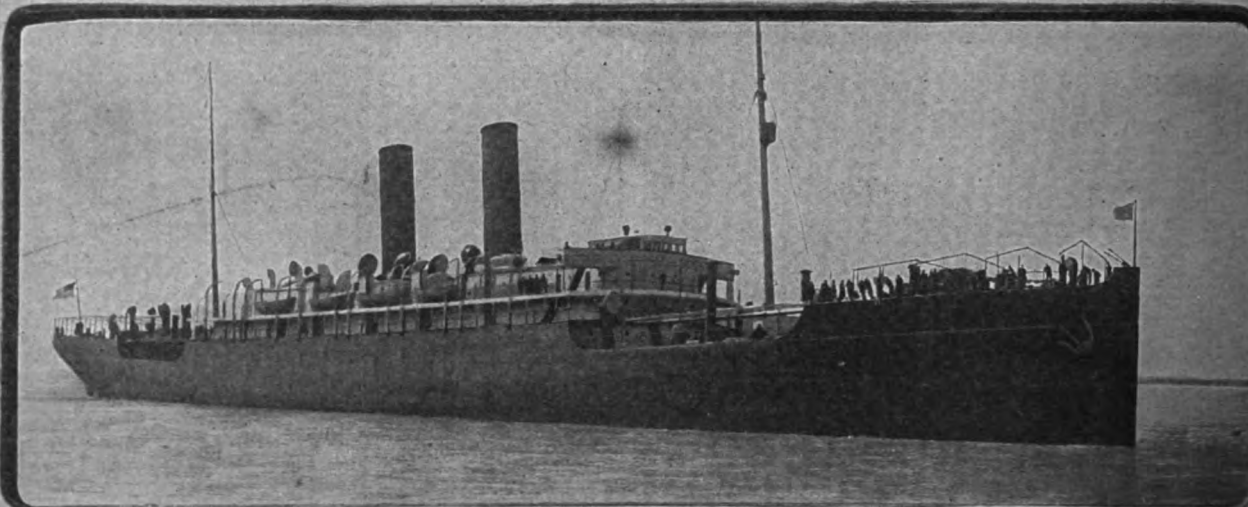
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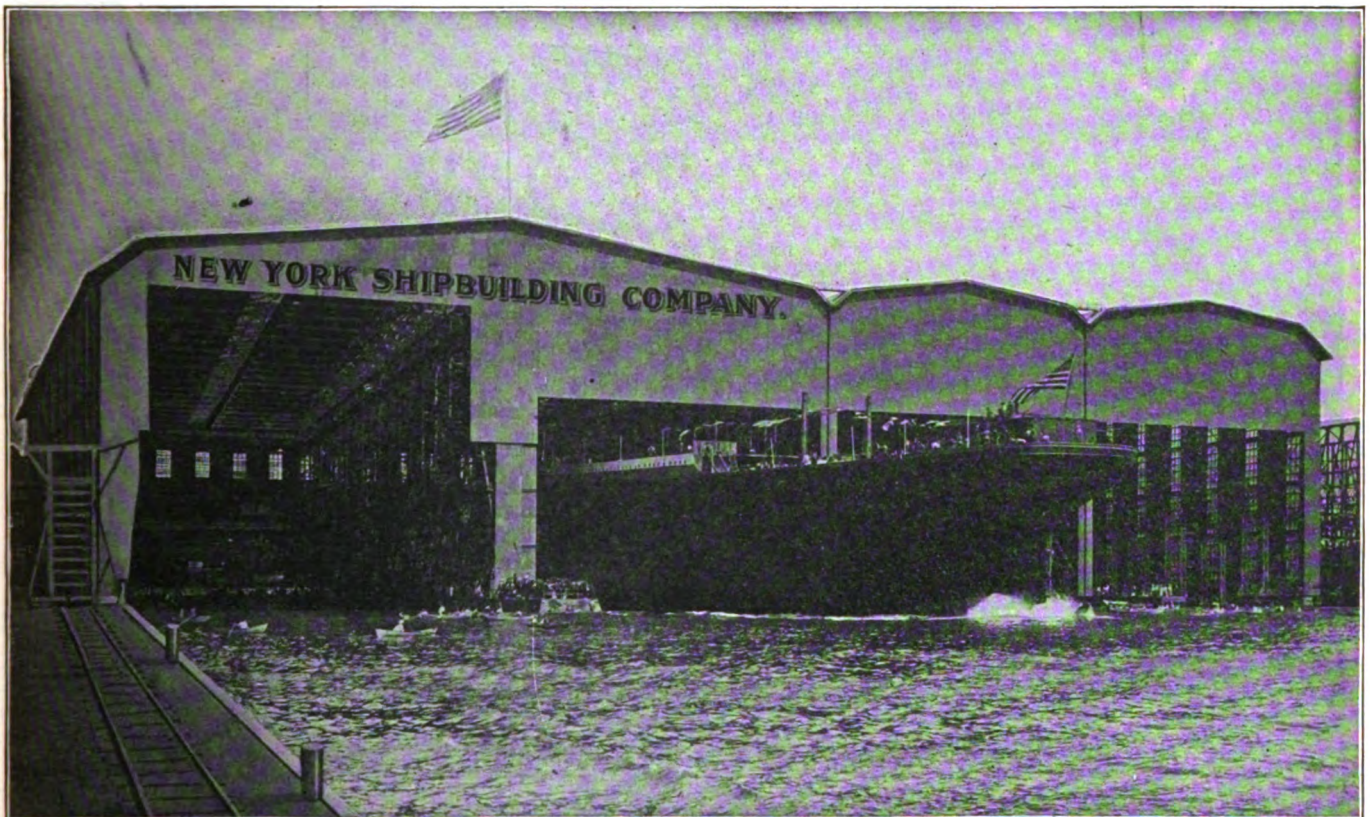
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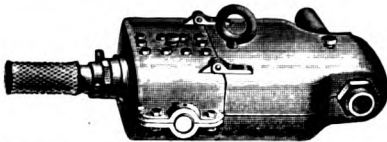
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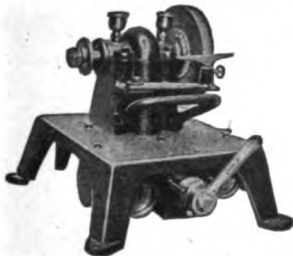
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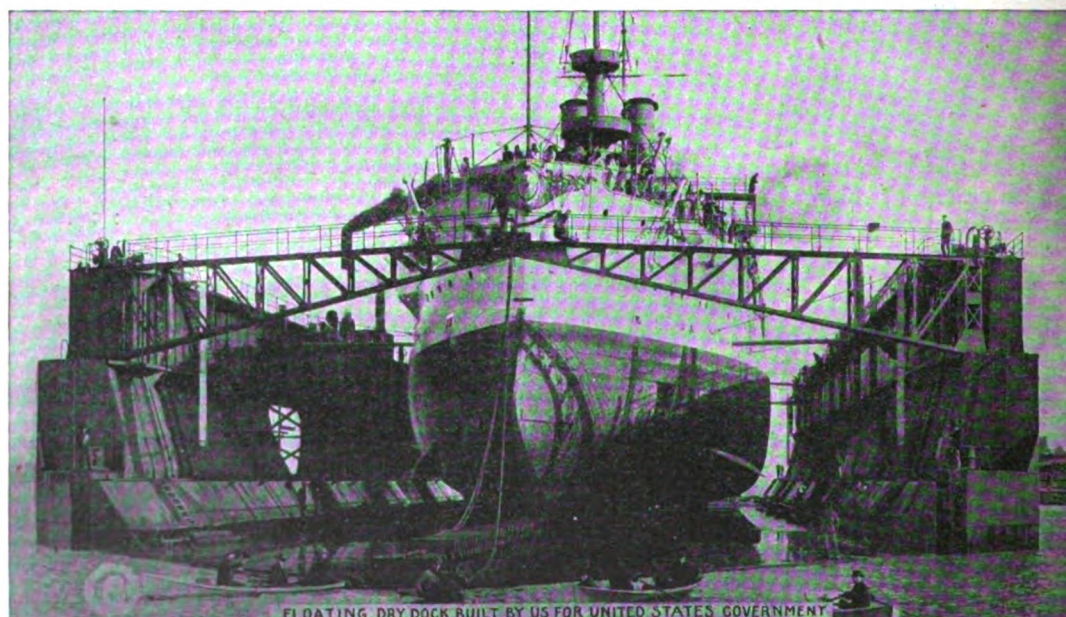
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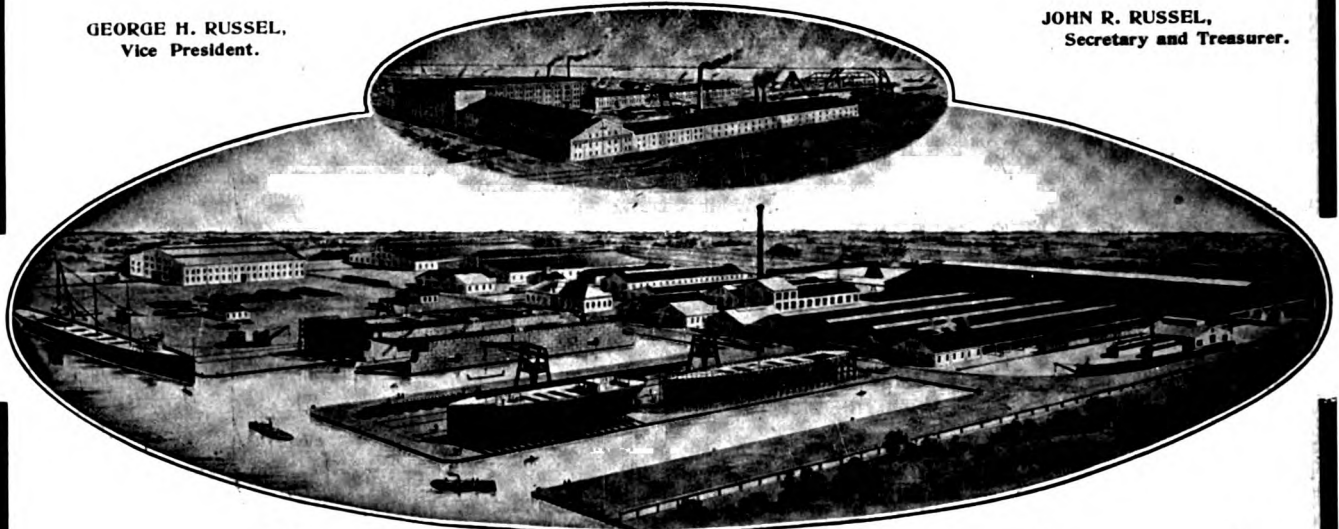
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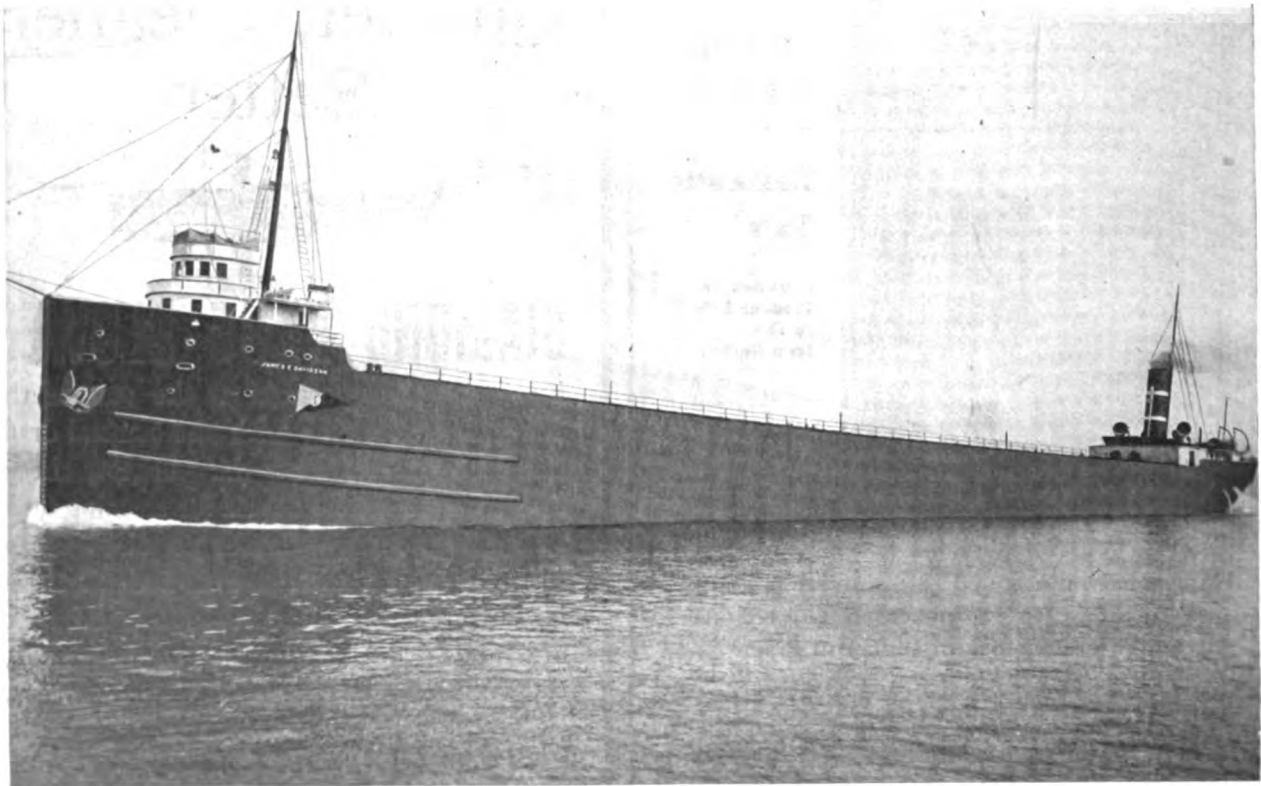
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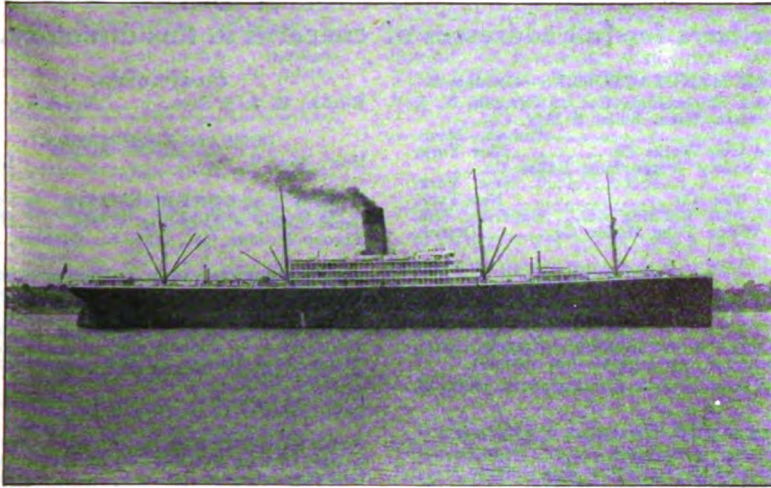


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See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.
Great Lakes Engineering Works.....Detroit.
Mietz, Aug.New York.

AIR PORTS, DEAD LIGHTS, ETC.
Marine Mfg. & Supply Co.....New York.

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Fore River Ship & Engine Co., Quincy, Mass.
Great Lakes Engineering Works.....Detroit.

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Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F., Co.....Hyde Park, Mass.

ASH EJECTORS.
Great Lakes Engineering Works.....Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

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Jenkins, Russell & Eichelberger.....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon Cleveland

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Cleveland Block Co.....Cleveland.

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Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co. Winthrop Harbor, Ill.

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Power Specialty Co.....Detroit.

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Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Deering Water Tube Boiler Co.....Detroit.
Detroit Ship Building Co.....Detroit.
East End Boiler Works.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Works.....N. Y.
Marine Iron Works.....Chicago.
Maryland Steel Co.....Sparrows Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co.....New York.
Newport News Ship Building Co.....
.....Newport News, Va.

BOILER MANUFACTURERS—Continued.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....
.....Duluth, Minn.
Quintard Iron Works Co.....New York.
Roberts Safety Water Tube Boiler Co.....
.....New York.
Stirling, The Co.....New York.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.

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Bourne-Fuller Co.....Cleveland.

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Fore River Ship & Engine Co., Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.

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Scherzer Rolling Lift Bridge Co.....Chicago.

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Upson-Walton Co.....Cleveland.

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American Ship Windlass Co., Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

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Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.
Woodhouse Chain Works.....Trenton, N. J.

CHAIN CONVEYORS, HOISTS.
Brown Hoisting Machinery Co. (Inc.).....
.....Cleveland.
General Electric Co.....Schenectady, N. Y.

CHAIN HOISTS.
Boston & Lockport Block Co.....Boston, Mass.

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Penton Publishing Co.....Cleveland.
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CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.
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Ironville Dock & Coal Co.....Toledo, O.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.
Brown Hoisting Machinery Co. (Inc.).....
.....Cleveland.

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COMPASS CORRECTORS.
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Great Lakes Engineering Works.....Detroit.
Thropp & Sons Co., John E., Trenton, N. J.

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Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
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Hubbell Co., H. W.....Saginaw, Mich.
Lake Superior Contracting & Dredging Co.
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Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H., Milwaukee.
Sullivan, M.....Detroit.

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Upson-Walton Co.....Cleveland.

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Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.

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Brown Hoisting Machinery Co.....Cleveland.

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Morse, A. J. & Son.....Boston.
Schrader's Son, Inc., A.....New York.

DRAFT, MECHANICAL.
Sturtevant Co., B. F.....Hyde Park, Mass.

DREDGING CONTRACTORS.
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Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
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Hubbell Co., H. W.....Saginaw, Mich.
Lake Superior Contracting & Dredging Co.
.....Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H., Milwaukee.
Sullivan, M.....Detroit.

DREDGING MACHINERY.
Quintard Iron Works Co.....New York.

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American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Tietjen & Lang Dry Dock Co.....Hoboken, N. J.

DREDGE BUILDERS.
Manitowoc Dry Dock Co.....Manitowoc, Wis.

DYNAMOS.
General Electric Co.....Schenectady, N. Y.
Mietz, Aug.....New York.
Sturtevant, B. F. & Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.

ECONOMIZERS, FUEL.
Sturtevant Co., B. F.....Hyde Park, Mass.

ELECTRIC HOISTS AND CRANES.
General Electric Co.....Schenectady, N. Y.

WANTED and FOR SALE Department.**PROPOSALS.**

U. S. Engineer Office, Buffalo, N. Y. November 27, 1905.—Sealed proposals for excavation in Black Rock Harbor, Buffalo, N. Y. will be received here until 11 A. M. January 15, 1906, and then opened. Information furnished on application. H. M. Adams, Col. Eng'rs.

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Sturtevant, B. F. & Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.

ENGINE BUILDERS, MARINE.

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Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros.....Philadelphia.
Lockwood Mfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrows Point, Md.
Mietz, Aug.....New York.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co.....Newport News, Va.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Mich.
Quintard Iron Works Co.....New York.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G.....Buffalo.

ENGINE BUILDERS, STEAM.

Sturtevant Co., B. F.....Hyde Park, Mass.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

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Marine Mfg. Supply Co.....New York.

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Mosher, Chas. D.....New York.
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Wood, W. J.....Chicago.

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Ross Valve Co.....Troy, N. Y.

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Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

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Sturtevant Co., B. F.....Hyde Park, Mass.

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Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B. & Co.....Detroit.
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Safety Car Heating & Lighting Co.....New York.

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Chase Machine Co.....Cleveland.

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Ashton Valve Co.....Boston.
Lunkenheimer Co.....Cincinnati.

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Bonner Co., Wm. T.....Boston.
Lunkenheimer Co.....Cincinnati, O.

GENERATING SETS.

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General Electric Co.....Schenectady, N. Y.

GRAPHITE.

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Greacen-Derby Engineering Co.....Perth Amboy, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

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Sutton Co., C. E.....Toledo, O.

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Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....Midland, Ont.
Hyde Windlass Co.....Bath, Me.
McMyler Mfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Mietz, Aug.....New York.

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HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

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Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

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Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

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Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Jenkins Bros.....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

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Elphicke, C. W. & Co.....Chicago.
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Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F. New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

IRON CASTINGS.

Sutton Co., C. E.....Toledo, O.

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Kahnweiler's Sons, D.....New York.

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Russell & Watson.....Buffalo.

LOGS.

Nicholson Ship Log Co.....Cleveland.
Walker & Sons, Thomas.....Birmingham, Eng.
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LUBRICATING GRAPHITE.

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LUBRICATORS.

Lunkenheimer Co.....Cincinnati.

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Hickler Bros.....Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....East Boston, Mass.

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Atlantic Works, Inc.....Philadelphia.

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MARINE RAILWAYS, BUILDERS OF.

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Katzenstein, L. & Co.....New York.

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General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Hyde Park, Mass.

NAUTICAL INSTRUMENTS.

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Kidd, Joseph.....Duluth, Minn.
Mosher, Chas. D.....New York.
Nacey, James.....Cleveland.
Wood, W. J.....Chicago.

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Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.

Mietz, Aug.....New York.

OILS AND LUBRICANTS.

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Standard Oil Co.....Cleveland.

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Katzenstein, L. & Co.....New York.

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Baker, Howard H. & Co.....Buffalo.
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Atlantic Works, Inc.....Philadelphia.

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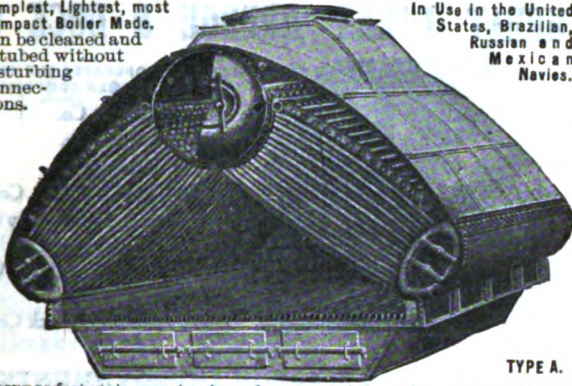
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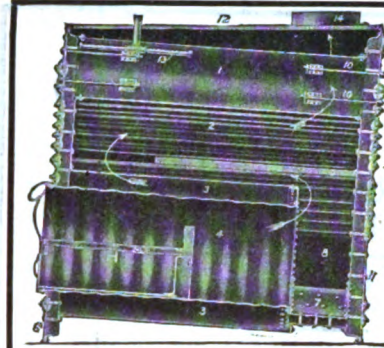
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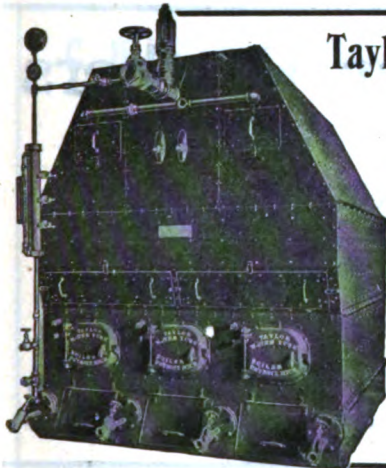
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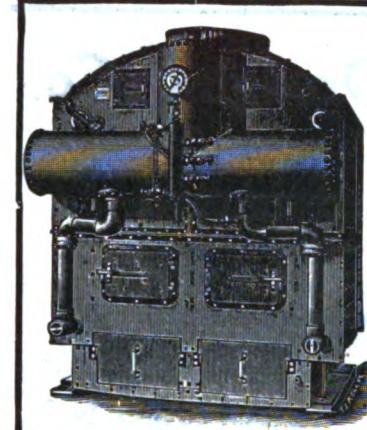
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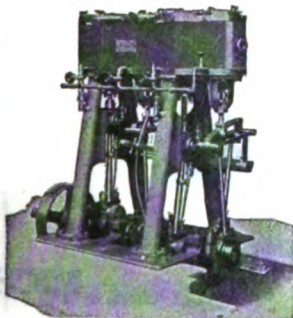
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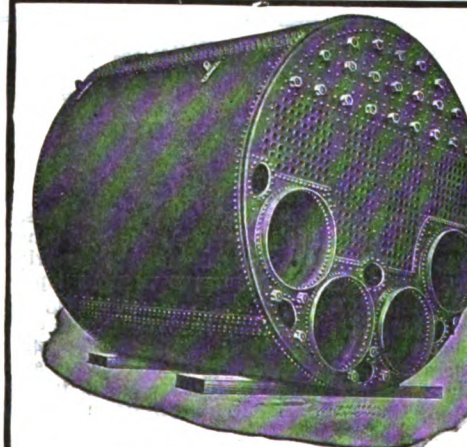
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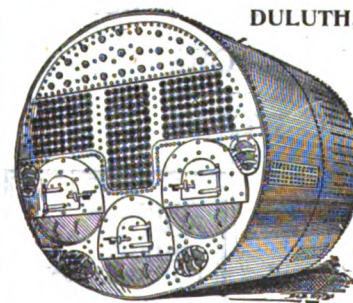
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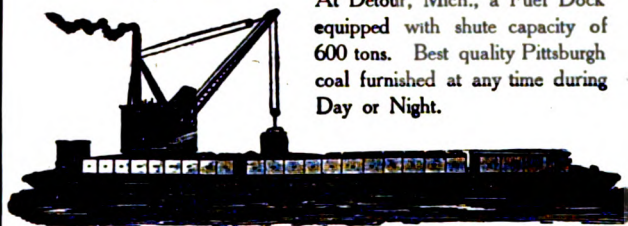
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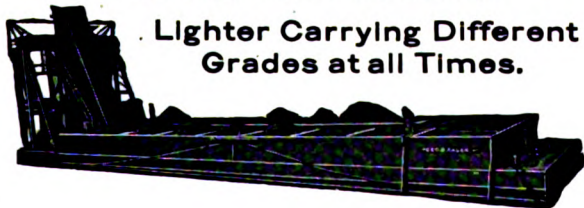
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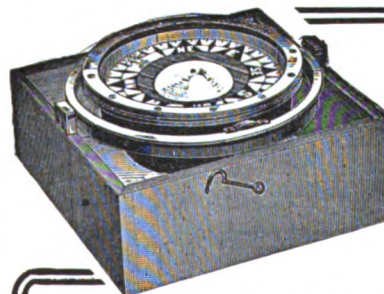
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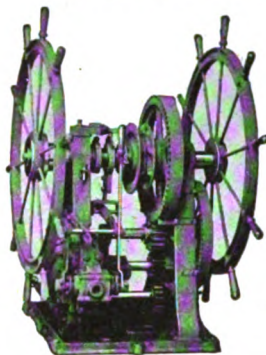
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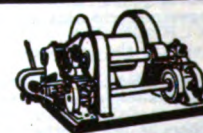
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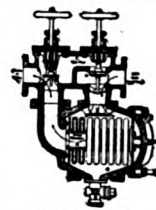
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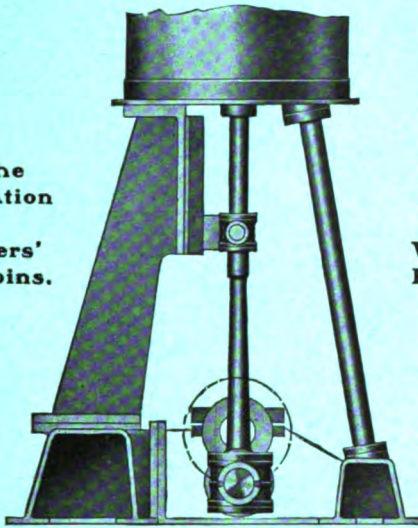
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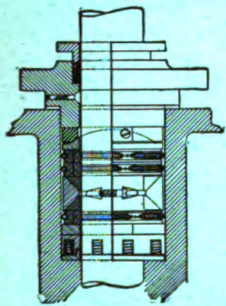
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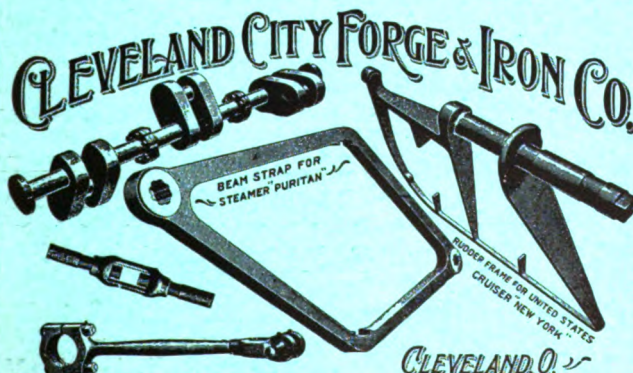
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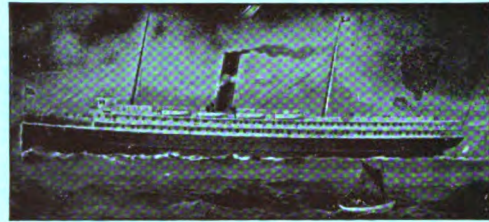
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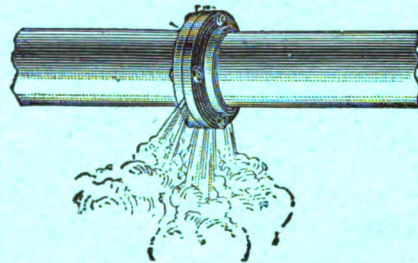
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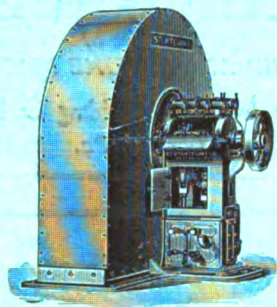


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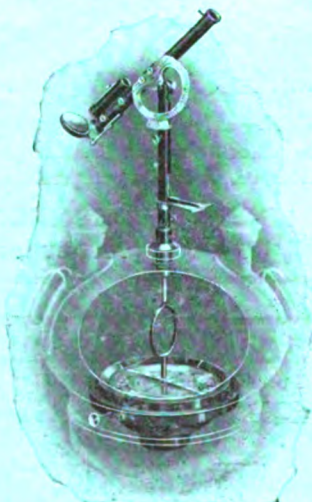
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